Duplicate

Illinois Medical Journal

OFFICIAL JOURNAL OF THE ILLINOIS STATE MEDICAL SOCIETY

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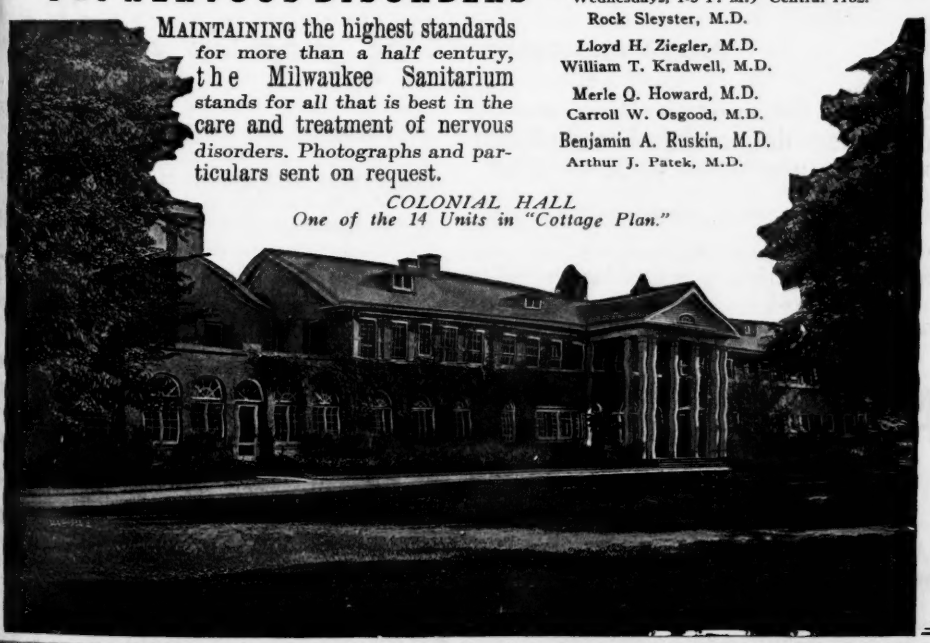

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The Illinois Medical Journal

August 1941
VOL. 80, NO. 2

Official Journal of the Illinois State Medical Society

EDITOR — Harold M. Camp. EDITORIAL BOARD — James H. Hutton, Chairman, Frederick H. Falls, Josiah J. Moore, Edwin M. Miller, Chauncey C. Maher, Harry S. Gradle, Philip H. Kreuscher, Harry Culver.

Editorials

MEET THE EDITORIAL BOARD

The Council of the Illinois State Medical Society, being responsible for the publication of the Illinois Medical Journal, has selected an Editorial Board which has been charged with definite duties. The Board will begin to function immediately.

In the future this Journal will refrain from the publication of editorials on controversial subjects, and will limit this department principally to the publication of timely scientific editorials.

The medical economics department will be continued as in the past. In addition to the consideration of the usual important and ever increasing subjects coming under this classification, we will devote some space to reports on medical preparedness and the role of medicine in our national defense. We will also include other reports which will be of interest to the many readers of the Illinois Medical Journal.

The members of our Editorial Board were selected carefully in an endeavor to have members of several specialties, and it was deemed advisable to limit the personnel of the Board to eight members.

THE EDITORIAL BOARD

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The Editorial Board will assume responsibility for the development of scientific editorials which will appear regularly in this Journal. They will aid in the selection of papers for publication and in solving various problems arising in connection with the editing and publishing of a medical journal.

It is the earnest desire of the Council of the Illinois State Medical Society, its Journal Committee, its Editorial Board, and the Editor, to make the Illinois Medical Journal more popular and of greater value to the members of the Society.

Suggestions, criticisms and comments will be appreciated by all those responsible for the preparation and publication of the Journal, and all will be given a most careful consideration.

POST GRADUATE EXTENSION SERVICE

The civilized world in general, and this country specifically, has in the past few decades travelled fast and far in its attitude towards post graduate training. Less than thirty years

ago Dr. James B. Herrick — appearing before an annual session of the American Medical Association decried the lack of hospital facilities for internship. He deplored the fact that only a minor percentage of graduates from our medical schools could be afforded this additional instruction. How far we have gone in the past three decades to substantiate Doctor Herrick's judgment!

Internship is a pre-requisite to the right to practice in many of our states. A one year internship has been found inadequate to encompass the rapidly gathering and shifting medical lore. The one year residency has proven so practical and so important that the specializing boards are demanding it as a requisite for certification in internal medicine, surgery, and many of the specialties.

One year residencies have given way to a second year or Senior Residencies, leading to a Master's or Doctor's degree in a chosen specialty. So much for Intra-Mural or Pre-Practice Post Graduate Extension. Let us now consider what has been done and what is being planned in the way of carrying the torch to the practicing physician.

Many states in the United States appreciating the importance and necessity of carrying Post Graduate Education to its far flung professional members, through the medium of their County Medical Societies, have well organized and functioning Post Graduate Committees. The individual plans of these various State Medical Societies differ rather widely, but they converge to a common principle of carrying scientific information to their members in ever increasing volume.

The Illinois Plan — The Illinois State Medical Society is a pioneer in this important work of Post Graduate Extension. Nineteen years ago the House of Delegates authorized the formation of an Educational Committee whose sole function was "To carry medical information to the lay public through the medium of a lay speakers bureau, the press and the radio and to convey scientific information to the medical profession through lectures before the widely scattered county medical societies." Four years later,

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Outside of editorial or allied views or statements that are the authoritative actions of the Illinois State Medical Society, the organization denies responsibility for opinions and statements published in the ILLINOIS MEDICAL JOURNAL. Views expressed by the various authors and views set forth in various departments in the JOURNAL represent the views of the writers.

State Society will pay no bills for legal services except those contracted by the Committee. Notify the Chairman at once. Do not employ attorneys.

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Subscription price of this JOURNAL to persons not members of the Illinois State Medical Society is $3.00 per year, in advance, postage prepaid, for the United States, Cuba, Porto Rico, Philippine Islands, Hawaiian Islands and Mexico. $4.00 per year for all foreign countries included in the postal union. Canada, $3.50. Single current copies, 50 cents.

or fifteen years ago, it was realized that the Scientific Servicing of county societies was of itself so vast and technical an adventure that it could be more creditably handled by a separate committee, working under the direction of the parent committee and so in 1926 the Scientific Service Committee was born.

This Scientific Service Committee which has had as its sole function the servicing of the 101 County Medical Societies with scientific programs has grown and expanded its field of usefulness from year to year. Whereas in the first year of its existence it boasted of a speakers personnel of fifty and arranged programs for thirty county societies, its records show that at present it has accumulated more than four hundred speakers, lecturers, and clinicians gathered not only from the teaching institutions of Chicago, but from the smaller county medical societies as well. This list of speakers and their subjects are all classified and published in book form and a copy is in the possession of every county secretary and every county president, thus rendering it very simple to arrange for an entire season of scientific meetings in advance, and at no cost to the County Societies. The State Medical Society, through a special budget, pays all the expenses, including the travel overhead of its speakers.

Two years ago the House of Delegates of the Illinois State Medical authorized the creation of still another committee to be known as "The Post Graduate Education Committee." The function of this committee was to study the broad problem of Post Graduate Medical Extension and after this survey to assist the Scientific Service Committee in enlarging its scope. This has led to a very important innovation in Post Graduate training. Specifically it has resulted in the institution of Post Graduate Conferences. The idea was originally plagiarized from the Texas State Medical Society which has been conducting a Three Day Annual Clinical Conference. It was deemed more practical in Illinois to attempt instead more conferences but of briefer (one day) duration. Four such Conference Days held the first year proved ultimately successful and led to nine the next year. The plans for the current year call for ten one day conferences held in various sections of the state. They operate as follows — beginning with a luncheon, three forty-five minute lectures on subjects previously chosen are followed by a Round Table discussion. Instead of one lecture, a clinic with the demonstration of patients has been found practical and interesting. At the dinner meeting at night, two outstanding speakers, and preferably one of a non-professional subject, complete the day.

In the interest of Public Relations it is both practical and advisable to inform the lay public of these conferences, either by inviting them to the evening meeting or by broadcasting over the radio selected portions of the programs.

And so as Time Marches On and the wheels of progress turn ever faster, and the mill grinds out in constantly increasing volume, let us in the profession who can, help separate the wheat from the chaff and by so doing lighten the load of those of our brethren who toil in the far flung sections of our state.

CLINICAL-PATHOLOGICAL CONFERENCE CASE REPORTS

With this issue of the Illinois Medical Journal, the reader will find some interesting Clinical-Pathological case reports which have been selected carefully, edited by the pathologist member of the Editorial Board, and published for the benefit of the readers of the Journal.

Under a new heading, these reports will be published regularly in the Journal. It is the desire of the Editorial Board and of the Editor, to make this a popular feature, in keeping with the general desire to improve in every way possible, the Illinois Medical Journal.

Every member of the Illinois Pathological Society has received a letter asking him to submit interesting case reports with pathological findings. These are to be sent to the pathologist on the Editorial Board who will assume responsibility for selecting the reports for each issue of the Journal.

Dr. Josiah J. Moore who is responsible for this department, will appreciate receiving case reports from conferences held anywhere in Illinois. This material may be sent to him at 55 East Washington Street, Chicago.

The doctors in forty-one of Michigan's eighty-three counties are refusing to take the low fees the state offers for treating indigent patients and are giving their services gratis.

QUESTION AND ANSWER DEPARTMENT

At the request of many members of the Illinois State Medical Society it has been decided that a new department will be created in the Illinois Medical Journal to be known as "The Question and Answer Department." This department is being developed to give physicians who read the Journal the opportunity to submit their questions, short case reports, or ask questions pertaining to the diagnosis or care of the patient with some unusual type of condition.

The questions should be sent to the editor, and will be referred to the Editorial Board for reply. The more interesting queries will be published in the Journal with the comments of the physician to whom it has been referred for answer. It is quite probable that this department will first appear in the September Journal, and physicians desiring to submit questions may do so during the next month, and at any time thereafter. When it seems advisable, a report will be sent by mail to save time, then the questions and answers will be published in the next issue of the Illinois Medical Journal.

In Memoriam

JOHN ROSS NEAL, M.D., Ph.G.

On July 1, 1941 shortly before midnight, death again struck among the ranks of the outstanding members of the Illinois State Medical Society, taking a physician known to the entire medical profession of Illinois for his untiring and ceaseless efforts to aid this profession which he loved so well.

John Ross Neal, a native of Illinois, spent most of his life in Springfield, but died at Grant Hospital, Chicago, after an illness of some three weeks following a coronary thrombosis.

For several years as a registered pharmacist, he owned and operated a drug store in Springfield. In 1909 he was graduated from Northwestern University Medical School in Chicago, and after taking an interneship, decided to practice in his home city of Springfield where he was associated with the late Dr. George N. Kreider.

Dr. Neal was a member of the medical corps of the Illinois National Guard, and was inducted into the United States Army as a medical officer seven days before war was declared in 1917. He served his country in France where he was at the front for eight months, holding the rank of Major.

After his release from service in 1919, Dr. Neal helped to organize the Abraham Lincoln Life Insurance Company and became its medical director, and later its secretary, which position he held during the life of that company. He was prominent in the building and operation of the Abraham Lincoln Hotel in Springfield where the family lived until they moved to Chicago some three years ago.

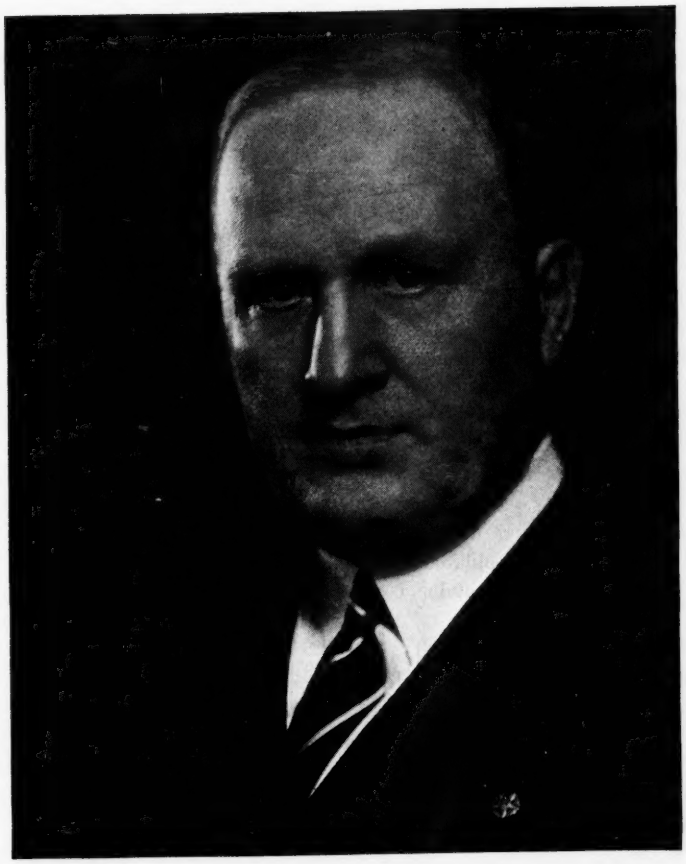
For twenty-one years John Neal was chairman of the Legislative Committee of the Illinois State Medical Society. It was in this field of endeavor that his work was recognized by medical leaders throughout the entire country.

Dr. Neal was president of the Illinois State Medical Society in 1933, a position he held for the customary one year, during which he gave freely of his time and thought to further the best interests of this organization.

During the long period of time that Dr. Neal was interested and active in medical legislation, he invariably had in mind the best health interests of the people of his state. He was a powerful factor in the moulding of sentiment to make the citizens of Illinois more "health conscious," and always, he was a champion of high standards in medical education and in the legal requirements necesary for the practice of medicine. Few men indeed have enjoyed such a wide and favorable acquaintance with legislators over a period of years. Never antagonistic in this line of work, yet invariably Dr. Neal was able to answer questions pertaining to health matters to the satisfaction of the most skeptical legislators. He was unalterably opposed to "lobbies" and invariably strived to show the effects on the citizenry of proposed legislative actions which he conscientiously believed unwise.

For approximately twenty years Dr. Neal was a member of the Medical Examining Committee of the State Department of Registration and Education. During this period of time he gave many hours to the consideration of the problems of medical licensure, keeping in mind always the responsibilities of this important position.

At the time of his death he was medical director of the Alliance Life Insurance Company, a position which he had held for many years. During this time he was considered one of the outstanding medical directors in insurance circles.



John Ross Neal, M. D., Ph. G.
1880 - 1941

Dr. Neal was also at the time of his death, Dean of the Cook County Graduate School of Medicine. During his tenure of office, he was ever anxious to build up and develop in every way possible this important post graduate school.

Dr. Neal married Flora Dempsey of Springfield on September 17, 1908, and is survived by his widow, two sons, Robert and John, both of Chicago, and two grandchildren, one of whom was born during his illness.

Dr. Neal, or "John" as he was known to thousands in Illinois and elsewhere, was indeed an outstanding character in medical affairs over a long period of years. His outstanding service as legislative chairman of the Illinois State Medical Society made him popular not only with the members of his own profession, but also with hundreds of members of our legislature who knew that his motives were always sincere and his efforts were prompted by a keen desire to see health conditions in his native state constantly improved.

John was always present at the annual meetings of his state medical society. It was rare indeed that he ever missed a meeting of the Council. His suggestions were always solicited when any problems of importance were under consideration.

The officers, the members of the Council, and the entire membership of the Illinois State Medical Society mourn with his family over the loss of John Neal. His passing leaves a vacancy which will indeed be difficult to fill.

"Unto each man his handiwork, unto each
his crown
The just Fate gives;
Who so takes the world's life on him, and
his own lays down,
He, dying so, lives."

Swineburne.

The health of the people is really the foundation upon which all their happiness and all their powers as a state depend.—Disraeli.

Complacency would be stupid while tuberculosis is still causing more deaths in this country than any other communicable disease except pneumonia, and while there are less than a hundred thousand sanatorium beds to care for half a million people with recognizable clinical infection. Geddes Smith.—*"Plague on Us" pub. by Commonwealth Fund, 1941.*

MEDICAL CARE PROGRAM

The Division of Old Age Assistance, in accordance with plans for a more adequate medical care program for recipients, has asked the Illinois State Medical Society to appoint a Medical Advisory Committee. Some of the problems upon which the Division feels the need of professional advice are: the discriminating use of existing facilities for medical care; interpretation to the professions and the community of the purpose of the program; establishing standards for medical care compatible with good medical practice.

The Committee was recently appointed by the President of the Society and includes the following physicians: Dr. Charles H. Phifer, Chairman, Chicago; Dr. Harold M. Camp, Secretary, Monmouth; Dr. E. P. Coleman, Canton; Dr. Julius H. Hess, Chicago; Dr. James H. Hutton, Chicago; Dr. John R. Neal, Chicago.

Several members of the Committee have served on the advisory committee to the Chicago Relief Administration since the inception of its medical program seven years ago, and are therefore thoroughly familiar with the problems of providing medical care for recipients of assistance. Other members of the Committee have held offices in the Illinois State Medical Society and the American Medical Association.

Representatives of the Division have held two meetings with the Committee in Chicago, and regular monthly meetings will be held hereafter. The Division will present to the Committee for approval all proposed general policies and problems regarding medical care. It is believed that the professional advice so obtained will enable the Division to plan a program which will greatly improve its service to the needy aged in Illinois.

Fletcher C. Kettle, Superintendent, Wallace Clark, Assistant Superintendent, and Miss Pearl Bierman, Medical Social Consultant, represented the Division of Old Age Assistance at the meetings.
—From *The Welfare Bulletin*—Ill. Dept. of Public Welfare, Apr.-May—1941.

Sulfanilamide in Urology—The clinical use of sulfanilamide in the treatment of infections of the urinary tract has grown very rapidly. The presentation of this paper in a medical section gives some indication of the marked inroad which its use has made in the urological specialty, many of whose patients this drug has returned to the medical fold from which they long ago strayed. The ketogenic diet, mandelic acid, and finally sulfanilamide with some of its derivatives have greatly simplified the treatment of gonorrhea and many of the uncomplicated bacillurias together with other relatively simple infections. Crenshaw and Cook have pointed out that in cases associated with cicatrical deformity of the pelvis and calices, obstruction due to stone, tumor, congenital deformity, or hyperplasma of the prostate gland, and in cases with marked urethritis, and especially chronic prostatitis, sulfanilamide is much superior to the other drugs.—*Simpson, Texas State J. Med.*

Correspondence

GOVERNMENT AGENCIES NEED MORE DENTAL HYGIENISTS

The number of Dental Hygienists secured as a result of an examination announced in January is not sufficient to meet the present needs of the National Defense program. Another examination has just been announced — this time on an "open continuous" basis — for positions as Dental Hygienist at $1,620 a year, less the usual 3½ percent retirement deduction.

Hygienists assist dental surgeons in hospitals, clinics, and relief stations. Cleaning and polishing of teeth, mixing materials, sterilizing and cleaning instruments, and similar duties may be a part of the work. Appointments will be made in the U. S. Public Health Service, the Veterans' Administration, and the War Department.

To qualify, applicants must be *registered* dental or oral hygienists who have completed a full course leading to graduation from a recognized school of oral hygiene. In addition, 2 years of experience are required in oral hygiene in public health or school work or in a private ethical dental office. Graduate dentists will be accepted for the examination provided they have had this experience in oral hygiene work.

Persons rated eligible on the examination announced in January need not file applications for this new examination as the register of eligibles established as a result of the old examination will be combined with the register resulting from the new. Other persons are urged to file their applications with the Commission's Washington office immediately, although applications will be accepted until further notice. Additional information and application forms may be obtained from any first- or second-class post office or from the Civil Service Commission.

AMERICAN CONGRESS OF PHYSICAL THERAPY TO CONDUCT INSTRUCTION COURSE MORNINGS THROUGHOUT ANNUAL SCIENTIFIC SESSION TO BE HELD IN WASHINGTON, D. C.

The 20th annual scientific and clinical session of the American Congress of Physical Therapy will be held September 1 to 5 inclusive, 1941, at The Mayflower, Washington, D. C.

The mornings will be devoted to the annual instruction course, and the afternoons and evenings will be devoted to the scientific and clinical sessions. The seminar and convention proper will be open to all physicians and qualified technicians.

All the phases of physical medicine will be covered in the general program, including a special symposium on poliomyelitis. The program will be of interest to the general practitioner as well as to the specialist in physical therapy.

For information concerning the seminar and preliminary program of the convention proper, address the American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago, Illinois.

At the same time the 25th annual meeting of the American Occupational Therapy Association will be held at The Mayflower. A combined meeting will be held on Wednesday, September 3, 1941. For information concerning the Occupational Therapy Association meeting, address Mrs. Meta R. Cobb, 175 Fifth Avenue, New York City.

AMERICAN CONGRESS OF PHYSICAL THERAPY
Walter J. Zeiter, M.D.
Executive Director

JUNIOR PUBLIC HEALTH NURSE ADDED TO GOVERNMENT NURSING POSITIONS NOW OPEN

The opportunities for qualified nurses to enter the Government service have greatly increased with the National Defense program. Public Health Nurses are particularly needed in the parts of the country where large defense industries are located.

A civil-service examination for Public Health Nurse ($2,000 a year) has been open for some time. Nurses who have been unable to qualify for this examination because of the *experience* requirement now have an opportunity to qualify through a new Junior Public Health Nurse examination ($1,800 a year) which requires *no experience*. Applications are also being received for examinations now open for Junior Graduate Nurse ($1,620 a year), and Graduate Nurse for general staff duty ($1,800 a year).

Appointments will not only be made for defense work in the U. S. Public Health Service under the jurisdiction of the Federal Security Agency, but to the Indian Field Service of the Department of the Interior. This new examination, thereby, increases the employment opportunities for nurses who are particularly interested in the Indian Service.

As in the case of the other nursing examinations open, no written test will be required for the Junior Public Health Nurse positions. Applicants will be rated on their education and experience. They must have completed a 4-year high school course which meets matriculation requirements of an accredited university or college. Subsequent to January 1, 1920 they must *have graduated from an accredited school of* nursing, having a daily average of 100 or more *patients. They must be registered graduate* nurses and in addition have completed at least *1 year of study in public health nursing* at a college or university whose course is approved by the National Organization for Public Health Nursing. Nurses who have had 1 year of supervised experience in general public health nursing may substitute this for one-half of the academic years' study in public health nursing. The maximum age is 45 years; the minimum height 60 inches.

The need for Public Health Nurses is urgent *and the Commission would* deeply appreciate your cooperation in this recruiting program to secure Nurses who are qualified for, and interested in, these Government positions. Further information and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

SEVENTH ANNUAL MEETING, MISSISSIPPI VALLEY MEDICAL SOCIETY

Cedar Rapids, Ia., October 1-3.

The Seventh Annual Meeting of the Mississippi Valley Medical Society, "The Mid-West's Greatest Intensive Post-Graduate Assembly for General Practitioners," will be held in the Hotel Montrose, Cedar Rapids, Iowa, October 1, 2, 3. The program will be given by 30 clinician-teachers who will *give over 40 lectures, demonstrations,* round table discussions, etc. A special *feature of the program will be numerous short instructional courses, there being 32 of these* scheduled. On Oct. 1, there will be an ALL-*Kansas City Program* conducted by 8 well-known clinician-teachers, concluding with a complimentary Stag Supper. On Oct. 2 — the annual banquet will be held with Dr. Joseph B. DeLee, Emeritus Prof. of Obstetrics and Gynecology, University of Chicago, and the Presidents, of Illinois, Missouri and Iowa State Medical Societies as *speakers. On Oct. 3 the short* instructional courses will be given by faculty *members from St. Louis University School of* Medicine. There will be a big technical and *scientific exhibit hall. Every ethical physician* is cordially invited to attend and no registration fee will be charged physicians in the uniform of the armed forces of the United States. The complete program appears in the September issue of the MISSISSIPPI VALLEY MEDICAL JOURNAL and further information may be secured from the Secretary, Harold Swanberg, M.D., W.C.U. Building, Quincy, Illinois.

EXAMINATIONS AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

The next written examination and review of case histories (Part I) for Group B candidates will be held in various cities of the United States *and Canada on Saturday, January 3, 1942, at* 2:00 P.M. Candidates who successfully complete the Part I examinations proceed *auto-*

matically to the Part II examinations held later in the year.

Applications for admission to Group B, Part I, examinations must be on file in the Secretary's office not later than October 6, 1941. Applications for Group A must be in the Secretary's office by March 1, 1942.

The general oral and pathological examinations (Part II) for all candidates (Groups A and B) will be conducted by the entire Board, meeting at Atlantic City, N. J., immediately prior to the 1942 meeting of the American Medical Association.

As previously announced in the Board booklet, this fiscal year (1941-1942) of the Board marks the close of the two groups of classification of applicants for examination. Thereafter, the Board will have only one classification of candidates, and all will be required to take the Part I and Part II examinations.

For further information and application blanks, address Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

Paul Titus, Secretary.

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE U. S. NAVY

The Surgeon General of the Navy, Rear Admiral Ross T. McIntire, (MC), U.S.Navy, announces the following schedule for examinations for appointments in the Medical Corps of the United States Navy:

Acting Assistant Surgeon for intern training:
October 6 to 9, 1941, inclusive.
January 5 to 9, 1942, inclusive.

Assistant Surgeon:
August 11 to 15, 1941, inclusive.
October 6 to 9, 1941, inclusive.
January 5 to 9, 1942, inclusive.

Examinations will be held at all of the larger Naval Hospitals and at the Naval Medical Center, Washington, D.C. Applications for authorization to take the examination must be in the Bureau of Medicine and Surgery three weeks prior to the date of the examination. Application forms for these examinations will be forwarded by the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., upon request.

Applications for appointment as Acting Assistant Surgeon for intern training are required to be citizens of the United States of over 21 but less than 32 years of age, members of the junior or senoir classes in class "A" medical schools, and to meet the physical and other requirements for appointment.

Applications for appointment as Assistant Surgeon are required to be citizens of the United States of over 21 but less than 32 years of age, graduates of class "A" medical schools, to have had at least one year of intern training in a hospital accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association, and to meet the physical and other requirements for appointment.

Acting Assistant Surgeons for intern training are assigned to United States Naval Hospitals which have been accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association, and after they have completed twelve months of intern training may, if they so desire, apply for appointment as Assistant Surgeon in the regular Navy.

Medical Officers of the Navy are encouraged to develope a specialty and if their interest in the selected specialty warrants, these officers are assigned to post-graduate instruction in the larger Naval Hospitals, the Naval Medical Center, Washington, D.C., and at civilian medical centers. Some of the specialties in which medical officers may seek qualification are: Surgery; Medicine; Ophthalmology; X-ray; Laboratory; Pathology; Public Health; Psychiatry; Deep-Sea Diving; Aviation Medicine (Flight Surgery); Gas Warfare; Tropical Medicine; Medical Research; Otolaryngology, etc.

A circular of information for applicants for appointment as medical officers in the United States Navy as Acting Assistant Surgeon for intern training and as Assistant Surgeon, Lieutenant (junior grade), Medical Corps, U. S. Navy, which contains full information regarding physical requirements, professional examination, rates of pay, and promotion and retirement data, may be obtained by addressing a communication to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C.

Medical Economics

Edited by R. K. Packard, M.D., Chairman of the Committee on Medical Economics of the Illinois State Medical Society, 826 East 61st Street, Chicago, Illinois.

The cost of medical care for those in the low income group has received much attention from various sources during the last several years. As a result of this wide-spread discussion many experiments have been tried to meet this particular problem, but up to the present time those experiments have not solved the problem of this particular group. One finds considerable difficulty in stating the annual income that places one in what we would term the low income group. This may vary in different states, in different counties and in different cities. That is to say that an income of $1200 a year might be adequate in one locality under certain costs of living and it might not be adequate in another where costs are entirely different. Nevertheless, we are agreed that there is a large percentage of employed people that come under the low income group classification. We are also agreed that they should have the same type of medical care as the people in the higher income bracket. We are further agreed that the medical profession itself has no control over their annual earning capacity excepting those who are employed directly by the medical profession itself. The question has been raised as to whether or not this group is now receiving adequate medical care. Surveys made by the American Medical Association would confirm that they are receiving, in the great majority of instances, adequate medical care, however, this care is being furnished, to a certain percentage, by the county hospitals, free dispensaries, clinics and charitable institutions. The problem then resolves itself, in general, somewhat as follows: Is it possible, under our present system of democracy and free enterprise, for management as a whole to pay a wage sufficient to raise this low income group up to an annual earning capacity whereby they can afford adequate medical care along with the other necessities of life such as food, shelter, clothing, education and so forth? You might ask, is it possible to do this if they are willing to work? This part of the problem, under our system of free enterprise, is one for management to assume some responsibility for. It goes without saying that management must have the cooperation of labor and of government to reach such a healthy goal. Further, management should have the cooperation of the medical profession to the end that the medical profession will always consider the income, the size of the family, the local conditions, and the amount of sickness in a given family for a given period of time, and render a bill for their services based upon such factors.

Under the present trend of agitation for some form of socialized medicine, it seems obvious that capital will be forced to pay the bill under taxation, and, therefore, in the long run, the cost will be greater. Furthermore, if we are earnestly seeking adequate medical care for the low income group, we do not believe that it can be found under socialized medicine or maintained under socialized medicine. The fact that, at the present time, we are the healthiest nation in the world speaks for the type of medical care the American people are receiving today.

A large part of the total cost of sickness, at the present time, is the hospital expense. Group hospitalization has offered in many areas a suitable solution for this problem, however, in most areas where group hospitalization is available the largest percentage of their subscribers are from those above the low income group. In the city of Chicago, the Plan for Hospital Care, now in the fifth year of its operation, has enrolled 270,000 subscribers. Some cities noticeably

Cleveland shows a much better record. A large percentage of subscribers in Chicago are in the income group above $1,500 a year. Here again is a problem for management in helping to solve a part of the problem for the cost of medical care. In many instances management has taken a very active part in attempting to secure the enrollment of their employees, however, equally true, in many instances, management has shown some reluctance. A large problem still remains with the low income group who state quite definitely that they cannot afford to pay the rates for hospital care which are as follows: single person, $9.60 per year; married couple $18 per year; full family group $24 per year. They state that they are already in debt and see no way to meet their present obligations and further state that they can secure, if they have to, medical care from the county hospitals, dispensaries, clinics and free institutions. In some instances, management has seen fit to pay either all or a portion of the premium for group hospitalization, and the question arises, is this profitable for management or is it unprofitable and prohibitive. Those who have inaugurated such plans feel that it is profitable because their employees feel a sense of security as regards their health and the health of their families that removes from them certain worries that undoubtedly effect the efficiency of their work. It would seem logical that, if the medical profession is willing to render their services at a low cost to the low income group, then management should also assume some responsibility along this line. Neither management nor the medical profession can place dollars above health. Yet both have to derive a livelihood from the pursuit of their occupation. We recognize, at once, that management is vitally interested and is very rapidly assuming its share of responsibility in providing health insurance, surgical benefits, hospital insurance and life insurance to a large number of its employees through various plans.

The medical profession also, was somewhat slow in realizing the importance of group hospitalization and many of the profession ten years ago were opposed to group hospitalization on the basis that it would tend to develop socialized medicine, and nearly all have changed their minds and now realize the benefits of group hospitalization to the public, to the hospital, and to the profession. We, as a profession, have to recognize the changing social and economic orders in our vast industrialized country just as management and government have also to recognize this, and it is a mutual responsibility to devise a method and means to meet these changes. Our responsibility relates to medical care and the cooperation we can give to management and to government in finding suitable solutions for the problems at hand.

Dr. R. K. Packard, Chairman
Committee on Medical Economics.

PERIL OF THE DIABETIC DRIVER

Still another driving hazard in the diabetic driver, says a writer in *The Medical World.* Insulin has proved a marvelous boon to the diabetic but it is an unfortunate fact that one who must take insulin is never entirely sure that he will not go into insulin shock. With the old insulin there usually were premonitory symptoms — sweating, nervous instability, disturbances of vision, extreme hunger — that warned him his blood sugar was getting low. The newer insulins, particularly protamine zinc insulin, have a tendency to lower the blood sugar so gradually that the person may go into shock without any warning. Furthermore, the continuous action of the insulin may throw the person into shock a second or third time after sugar has brought him out of the first attack. It is easy to see the menace to others the diabetic driver may become. A news item several years ago told of a driver being arrested for drunkenness and proving in court that he never touched alcohol but was subject to insulin shock. One can sympathize with the diabetic who finds it necessary to drive a car, but for the public good it may be found essential to bar him from an automobile license.

It has long seemed that a government should have a department of health, as well as one of state or of interior. Medical men working in private capacities have done much and are doing much to develop, systematize and teach the principles of sanitary science, but it stands to reason that an organization of the kind indicated might accomplish much more. Our Federal Government has shown a commendable spirit of liberality by assisting in other measures of scientific, commercial or national importance. It has sent ships and astronomers to distant points to observe an eclipse of the sun or a transit of Venus; has fitted out expeditions to search for an open polar sea. . . .

Is human life so cheap and valueless that the government need put forth no efforts to preserve and prolong it?—*Sanders, Transactions of the Association.* 1884.

Original Articles

THE SURGEON AND THE ULCER PROBLEM:

With emphasis on (1) definition of the criteria of an acceptable operation and (2) the importance of maintaining caloric and nitrogen balance in the preoperative preparation and the recovery period in poor risk patients.

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The researches presented here were supported by grants of the Graduate School of the University of Minnesota, The Augustus L. Searle Fund for Experimental Surgical Research, the Committee on Scientific Research of the American Medical Association, and by a grant for technical assistance by the Work Projects Administration, Official Project No. 665-71-3-69, Sub-project No. 58.

Ulcer is a common cause of death, being superseded in the mortality columns in abdominal lesions only by cancer of the stomach and appendicitis. When the morbidity factor is taken into account, it looms large as a cause of illness, for throughout the entire life span, from birth to advanced years, patients may suffer, be incapacitated or die from ulcer or one of its complications. Death from hemorrhage from a duodenal ulcer attends the very extremes of life, occurring in the new-born and the infant, as well as the octogenarian. Obstruction, hemorrhage, and even perforation may recur several times during the life time of a single patient with an ulcer. Whereas, ulcer and its complications may shorten life more common occurrences are periodic episodes of disability and unhappiness occasioned by pain and other consequences of ulcer.

The Nature of the Ulcer Diathesis. Many factors have been alleged to play a role in the causation of ulcer. More and more, however, it has become increasingly apparent that acid is the common denominator of the disease. Palmer has observed that authentic cases of achlorhydria in ulcer are extraordinarily infrequent. Other well-known facts attest the great importance of acid in the genesis of ulcer: 1. The occurrence of typical ulcer, in a Meckel's diverticulum of the small intestine, in the presence of a small ectopic growth of gastric mucosa in it. Such an ulcer may bleed or perforate as occurs in a typical duodenal or gastric ulcer; 2. The rarity or absence of ulcer in patients with pernicious anemia; 3. Absence of ulcer, at gastro-jejunostomy stomas, in patients with carcinoma of the stomach.

Even more significant is the experimental evidence in emphasizing the importance of acid in the causation of ulcer. The Mann-Williamson operation which diverts the alkaline bile and pancreatic juice into a lower level of the intestine, precluding neutralization of the acid gastric juice and the achievement of an intestinal chyme with a neutral PH, fairly high in the jejunum, is followed quite consistently in the dog by a high incidence of gastrojejunal ulcer at the new gastric outlet. When retrograde regurgitation is prevented by the insertion of a Dragstedt valve, diversion of bile and pancreatic juice is followed by gastrojejunal ulcer in 100 per cent of instances. Placement of organs with their blood supply intact within an isolated gastric pouch in the dog, is followed consistently by digestion of the organ.

Ulcer Produced by Stimulation of Gastric Secretion by Histamine. More recently, in this laboratory, employing Code's method[6] of implanting histamine in beeswax, to permit gradual liberation of the histamine, ulcer has been produced consistently in the dog, cat, guinea pig, chicken, duck and the pig.[16, 27, 28] Superficial erosions have followed intramuscular implantation

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of histamine in beeswax in the monkey, woodchuck, calf, and rabbit. In the first group enumerated above in which typical ulcers were produced, perforation and hemorrhage were the rule.

That pepsin plays a role in the erosive process of ulcer formation is not to be denied. Yet, it is accepted quite generally that histamine does not stimulate gastric secretion in a physiologic manner, inasmuch as the juice secreted under the influence of histamine is high in acid and poor in pepsin. A concentration of 170° or clinical units (.625 hydrochloric acid) has been observed in a dog with an isolated gastric pouch under histamine stimulation. The secretion of acid under histamine stimulation, in such instances, is probably so rapid that no opportunity is afforded for reduction of acidity by secretion of mucus and other intrinsic neutralizing factors which operate normally to regulate the acidity of the gastric juice. Concentration of .625 per cent. of hydrochloric acid represents the maximal concentration of hydrochloric acid, that the gastric glands are capable of secreting. Schiffrin's insistence that pepsin is the significant factor in ulcer production does not appear to be a stand well taken in the light of the histamine-produced ulcer.

Management of Ulcer. Effective therapy must, of necessity, be directed at the reduction of gastric acidity. The frequent ingestion of food is probably the most important single item in the control of gastric acidity. The experience of Dragstedt and his co-workers on the comparative rate of the erosive process of gastric juice upon organs implanted intact into the stomach and isolated gastric pouches gives added proof of the inhibiting capacity of food, present within the stomach. Dragstedt and Vaughn failed to find evidence of digestion of tissues, when implanted into the intact stomach; when, however, similar implantation of tissues, pedicled on their blood supply was made into isolated gastric pouches into which food did not find its way, Matthews and Dragstedt, observed regularly, advanced grades of digestion of the implanted tissues.

The selection of food is probably of lesser importance than frequent feeding. It is to be recalled that Pavlov employed meat, milk, and bread to assess the seretory response in the dog and observed that all were keen stimulants of the gastric secretory mechanism, as was water also. When employing corresponding nitrogen equivalents of meat, milk and bread, Chigin, who carried out the experiments under the direction of Professor Pavlov, made the following observations:

1. Feeding of 100 grams of meat produced 27 cc. of gastric juice with a digestive strength of 4 mm.;
2. In response to 600 cc. of milk (equivalent in nitrogen value of 100 grams of meat) 34 cc. of gastric juice with a digestive capacity of 3.1 mm. was secreted.
3. The feeding of 250 grams of bread produced 42 cc. of gastric juice with a digestive strength of 6.16 mm.

From similar amounts of bread, milk, and meat it may be concluded from Pavlov's observations that meat and bread produce a gastric juice of strong digestive capacity; that less juice is secreted in response to bread and milk and that the digestive strength of milk juice is relatively low as contrasted with meat and bread.

Though the gastric secretory mechanism is stimulated unequally by most foods, it should be borne in mind that all foods, including water, may stimulate the secretion of acid. It may be said quite fairly, I believe, that more attention has been paid to the form of the diet of patients with ulcer than to the effect of various foods upon the acid-secreting mechanism.

Night Secretion. On the dog, Pavlov failed to observe a basal level of secretion and believed that acid secretion disappeared during fasting. In man, however, in the patient with or without ulcer, it has been demonstrated adequately by Carlson and others,[17] that there is a basal level of secretion. As a matter of fact, the liberal secretion of hydrochloric acid at night can be verified easily by applying suction to an indwelling duodenal tube. Surprising quantities of gastric juice of high acidity may be recovered quite regularly. As Winkelstein has pointed out, patients with ulcer are more likely to exhibit high acid values in the night secretion, than patients without ulcer.

It is this item of *uncontrolled* night secretion, over which effective management of ulcer breaks down. If acid secretion could be depressed effectively during the hours of sleep, when no food is ingested, the efficacy of medical management would be enhanced considerably, undoubtedly. An alarm clock can, no doubt, be used to good

purpose to lengthen the hours over which control of acidity may be achieved by frequent feedings. Administration of a physiologic dose of atropine at bedtime should prove helpful also. Yet, extension of the effectiveness of medical management of ulcer awaits the development of new methods to depress gastric secretion.

The Surgeon's Responsibility in the Management of Ulcer.

(a) *Perforation.* Perforation, which is the most important factor in ulcer mortality, is by common consent a complication which demands the intervention of the surgeon. Early closure of the defect is admitted generally as the only procedure which will assure any measure of success.

(b) *Hemorrhage.* Reports from large, general hospitals indicate that the mortality from *massive hemorrhage* in ulcer is in the neighborhood of 10 per cent, a much higher figure than is believed generally to be the case. Finsterer (Austria), Gordon-Taylor (England), and Allen (Boston) have long been advocates of the operative management of patients with massive hemorrhage from ulcer. General recognition of the risks run by patients with massive hemorrhage, and development of a satisfactory technique of dealing with the bleeding point and closing the duodenum will result in the salvage of many patients, whose lives are allowed to ebb away because of failure to control bleeding. It is well known, that the majority of such fatal hemorrhages occur from a perforated posterior wall duodenal ulcer, with erosion of the gastroduodenal artery. Ligature of the bleeding vessel and closure of the duodenal wall present a difficult surgical problem. The pancreas, in the writer's experience, provides an accessible and dependable tissue to insure tight and safe closure of the open duodenum.[31] The method depicted in Figure 1 has been employed in several cases of massive hemorrhage.

In a recent discussion of the problem, of the management of massive hemorrhage in the patient with duodenal ulcer, Roscoe Graham, who speaks from a large surgical experience, and others expressed themselves as being opposed to active surgical intervention, feeling that more lives would be lost than saved by this expedient. The two problems which demand the attention of the surgeon, who essays to deal with such cases surgically, as described above are: 1. Absolute arrest of hemorrhage and 2. Safe closure of the duodenum, such that leakage can not occur. The first of these is easy of accomplishment; the latter may be extraordinarily difficult.

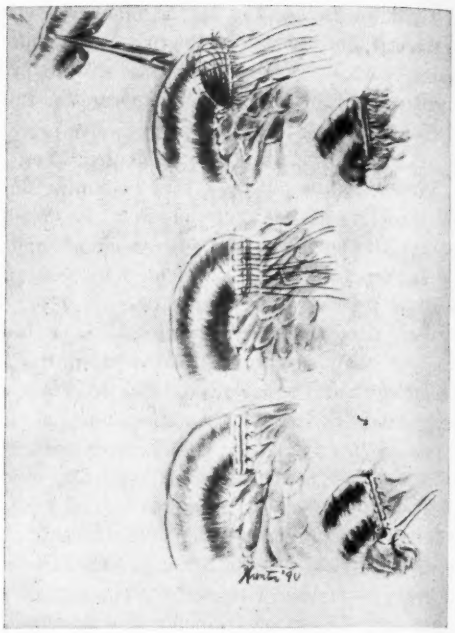

Figure 1. The writer's method of closing the open duodenal stump in duodenal ulcer with massive hemorrhage. This technique fulfills the two important desiderata of a satisfactory operation, which are: (1) absolute control of hemorrhage and (2) safe closure of the duodenum precludes leakage. (Reproduced through courtesy of Surgery.)

In the group of patients with bleeding ulcer, subjected to emergency operation, previously reported by the writer, there were several whose status was grave. The operation in some of them is described well, in the terms, antemortem operation. Two patients out of 17 operated upon to date, have been lost. One was a technical failure and death occurred. The other failure occurred in a man past 80 years in whom ill-advised surgery was undertaken, as a measure of last resort.

Meulengracht admits having allowed 9 patients to die of massive hemorrhage, without operative intervention, believing that nothing could be done for them. Meulengracht's figures, on the success of frequent feedings in the management of bleeding ulcer, would not appear so impressive if one knew how many were cases of

massive hemorrhage with shock, in which it was difficult or impossible to sustain a normal blood pressure, despite repeated transfusions.

Dragstedt's experience, with the lesser erosive process in organs implanted into the full stomach, supports Meulengracht's thesis that frequent feeding is an important principle in the arrest of hemorrhage from a bleeding ulcer. To accept failure with resignation, as inevitable in the ominous bleeding patient, is to deny *established fact*. The operation *can* be done, even in the ante-mortem case, with a reasonable mortality. Utilization of the pancreas, in effective, adequate closure of the open duodenum, is the factor that makes the procedure feasible.

Wide adoption of aggressive surgical means of arresting hemorrhage from bleeding ulcer, is to be discouraged. Creditable achievement in this particularly difficult aspect of gastric surgery, is to be accomplished, only, by concentrating the surgery in the hands of those anxious and willing to give the matter the study, time and experience, which the matter justifies.

c) *Obstruction.* Persistent obstruction is a compelling indication for operation. Many instances of obstruction relent with bed rest and the temporary withholding of feeding by mouth. Too often, however, the trial on conservative management, on such patients with antispasmodics and gastric aspirations, is too protracted and such patients reach the surgeon in poor condition to withstand operation. The manner of preparing such patients for operation will be dealt with in a subsequent section of this paper.

d) *Pain.* Patients who secure adequate relief on conservative management, and who do not experience inconvenience because of dietary restrictions imposed on them, will not need the attention of the surgeon. There are, however, a large number of patients, who suffer repeated recurrence of their ulcer and who are disabled for several weeks to months at a time. Such patients, in the main, welcome a surgical procedure, which holds out a reasonable promise of relief.

What Has Surgery to Offer the Ulcer Patient? Recognizing the great importance of acid in the genesis of ulcer, one of the primary considerations of the surgeon should be choice of a procedure which would reduce gastric acidity, effectually. The number of procedures which can be depended upon to accomplish this objective consistently are not numerous. Operations which fail to reduce gastric acidity leave too much to chance and are not to be recommended. Most operative procedures on the stomach, whether anastomotic procedures which establish a new outlet, or excision types of operation in which a portion of the stomach is sacrificed as well, are attended quite regularly by a decrease in emptying time of the stomach. Reduction in gastric emptying time, alone, without reduction in gastric acidity, prejudices the future for the patient, in that no assurance against recurrent or stomal ulcer is afforded.

This is the *crux* of the matter with reference to employment of surgery in the management of ulcer. Emery and Monroe, writing with the background of a broad experience in the management of ulcer, state that medical treatment, in a large number of instances, is unsatisfactory. In a patient with the ulcer diathesis, one can not speak of medical cure. To be sure, there are undoubtedly instances in which the ulcer, together with all manifestations of its presence, disappears. Yet, the ordinary patient with an ulcer is doomed to bear his cross with the vicissitudes of fortune throughout life.

Emery and Monroe observed that the results of surgical procedures, in the main, were no more promising than in the group treated conservatively. Insurance statistics indicate, likewise, that the most important cause of death in patients who have had surgical treatment is recurrent ulcer.[33]

The urging of an operation upon a patient for the relief of ulcer is not, therefore, a light matter. If gastric acidity is not reduced effectively, the patient runs a large hazard of developing a stomal ulcer, let alone curing the ulcer for which the operation was undertaken. It is needless to say that the status of such patients is far worse and more serious than the original condition.

What Are The Criteria of an Acceptable Operation? Up until now, the success of a procedure has been determined largely by whether the patient developed recurrent symptoms of ulcer. In the final analysis, such a scheme, of necessity, is a good criterion. Unfortunately, however, it often takes years to evaluate the worth of an operation on this basis. In the meanwhile, a large number of operations are

performed on the basis that a given procedure is endorsed by someone, who professes to speak with authority. The fallacy of this practice is not difficult to detect. A number of surgeons, in many places, attempt to assess the worth of a suggested procedure in the absence of general, crystallized agreement concerning the value of any or all procedures. As a result, many patients with ulcer have procedures of questionable worth performed upon them. Surgeons and patients must wait for years, with suspended interest, to know whether the experiment was a success or failure.

This scheme of assaying the value of operations performed for ulcer has been continued too long. Now, that the importance of effectual reduction in gastric acidity is becoming recognized generally as the *sine qua non* of a successful operation for ulcer, one can set up simple experimental criteria to assess the value of an operation, rather than to wait for years the outcome in patients submitted to operation.

It may be debated whether the achievement of achlorhydria is a reasonable objective. This writer entertains the conviction that if the patient can be made persistently achlorhydric, he will not develop a recurrent ulcer. The experience of this clinic with the surgical management of ulcer appears to support this belief.

In this paper, only those patients who have shown no free hydrochloric acid after three successive injections of histamine at half-hour intervals in doses of one-half milligrams (total of 1½ mg.), in repeated trials are described as being achlorhydric.

It will be observed (Table I) that in our most successful group employing this criterion, we have achieved this grade of achlorhydria in only 65 per cent of the cases. However, 80% of the patients have been achlorhydric persistently after operation, save for the appearance of free-Hcl on a single specimen. It is to be admitted freely, that such maximal stimulation of the gastric secretory mechanism, by three successive injections of histamine, may constitute a more severe test, of a successful procedure, than is necessary. Yet, if a patient remains persistently achlorhydric when submitted repeatedly, at varying intervals of time, after operation to this crucial test, he is not likely ever to suffer from recurrent ulcer.

What Operative Procedures Reduce Gastric Acidity Effectually? For a period of half a century, patients with ulcer have been submitted to operation in increasing numbers. Applying the criterion of *wait and see,* it has been difficult to determine with wide application, in large and small hospitals throughout the world, of frank

TABLE I

Incidence of Achlorhydria and Gastrojejunal Ulcer After Varying Types of Operation for Ulcer

Type of Operation	Number of patients	Number of Patients Consistently Achlorhydric to Triple Histamine	Gastrojejunal Ulcer
Group I (Gastrojejunostomy)	29	0	10%
Group II (Antral or Partial Gastric Resection)	6	0	2 (33%)
Group III (Three-quarter Resection, Excising Antrum)	63	41 (65%)	0
Group IV (Finsterer Exclusion)	12	3 (25%)	1 (8.5%)
Group IV A (Finsterer Exclusion With Excision of Remnant of Antral Mucosa)	9	6 (66%)	0
Group V (Antral Resection plus Total Intra-gastric Regurgitation)	3	0	2 (66%)
Group VI (Extensive Gastric Resection and Gastrojejunostomy)	8	2 (25%)	0
Group VII (Extensive Gastric Resection)	5	0	0

*Only 29 patients submitted to study after triple stimulation with histamine. In 138 patients, who have had gastrojejunostomy, gastrojejunal ulcer was observed 14 times.

experimental operations, as such empirical procedures of necessity are, which the worthwhile procedures in the relief of ulcer are. Such a criterion does not have a sharp enough end-point. Conflicting reports in consequence have emanated from clinics, the world over, concerning the values of a given procedure. Operations have been extolled, which time and the sharper end-point of effectual reduction of gastric acidity have shown to possess but little inherent merit.

In our own clinic, a number of operations have been set up, in an attempt to assess the value of an operation from the standpoint of effectual reduction of gastric acidity. These operative procedures are depicted in Figure 2. They permit evaluation also of the validity of the Edkins'

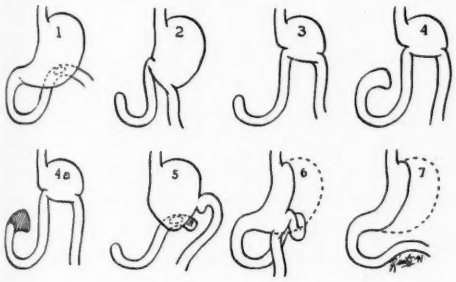

Figure 2. The operative procedures which have been set up to test the validity of the Edkins' hypothesis and to determine what type of operation reduces gastric acidity most effectively. The results are outlined in Table I, which carries, also, a brief description of each operation. It may be remarked here, that all of these operations are accompanied by a reduction in emptying time of the stomach.

hypothesis of control of gastric secretion, which theory has come to have practical connotations of great importance for the surgeon doing gastric surgery. The Edkins' theory suggests that a hormone having its origin in the antral gastric mucosa, in a sense, is the *regulator* or *titillator* for the secretion of acid from the stomach, as a whole. Whereas gastric glands are distributed throughout the whole of the stomach, it has been known for a long time that there are no acid-secreting cells in the gastric tubules in the prepyloric zone of the antrum. The distribution and concentration of gastric glands is largely as shown in Figure 3.

Results of the Study

The results of the inquiry are shown in Table 1. A preliminary report upon the data was made previously and within the past year,[33] my associate, Doctor Bernard Lannin, has been continuing the inquiry.

Study of Table I indicates that the Group III operation (see Figure 2) is the most satisfactory procedure viewed from the standpoint of effectual reduction of gastric acidity. Gastro-jejunostomy is the least satisfactory of all operations. Performance of gastro-jejunostomy for bona fide cases of duodenal ulcer, as indicated in the Group I represented in the Table is not attended by achlorhydria, but is followed by a high incidence of gastro-jejunal ulcer.

In a recent study, Church and Hinton observed an incidence of gastro-jejunal ulcer in 18 per cent of gastro-jejunostomies followed for a period of years. This writer has undone gastro-jejunostomies, either because of gastro-jejunal ulcer or because of failure of the procedure to relieve the ulcer, in a number of instances, 20, 30, and even 38 years after the gastro-jejunostomy was performed.

With reference to the Edkins' hypothesis, Groups II, IV, IVA, and VI operations shed important light on the matter. It is to be noted that the small, antral gastric resection (Group II) is not followed by achlorhydria; achlorydria attends leaving a part of the antrum, but sacrificing a liberal portion of the acid-secreting area (Groups IV and VI) in only 25 per cent. of the

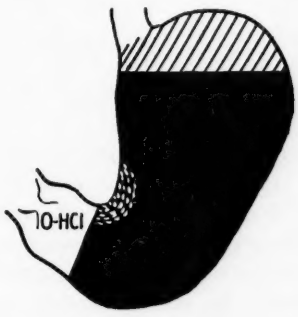

Figure 3. The black area represents the zone in which the distribution of the acid-secreting cells is maximal in the stomach. In the white prepyloric region of the antrum, there are normally no parietal cells or acid-secreting cells. It is this area which is referred to commonly, as the "regulator" or "titillator" of acid secretion (Edkins' hypothesis of gastric secretion.) The shaded areas indicate a lesser concentration of acid-secreting cells. (After Berger Am. J. Anat. 8:87-34.)

cases. The Group IVA operation, however, in which the pyloric sphincter is left, but the residual antral mucosa removed, is followed by persistent achlorhydria, in a fairly high per cent of cases (66%). It may be inferred, therefore, on the basis of the Group II procedure that the Edkins' hypothesis is invalid. Moreover, on the score of procedures IV, and VI it is to be assumed that the Edkins' hypothesis has merit, in that leaving a fragment of the antral mucosa lessened materially the opportunity of making the residual stomach achlorhydric. It is to be admitted that the use of maximal stimulation with histamine, by three successive injections of ½ milligram doses at half-hour intervals, as carried out in these observations, introduces the factor of an additional stimulus, beyond the presence or absence of the source for gastrin, described by Edkins'. Nevertheless, the observed incidence of spontaneous gastro-jejunal ulcer (Group II) and the capacity of the operations II, IV, IVA and VI (with a source for gastrin potentially present or absent), to make the patient achlorhydric have a fairly good correlation. As yet, gastro-jejunal ulcer has been observed only in Groups I, II, IV, and V. In any group, in which achlorhydria is not achieved frequently, recurrent ulcer will undoubtedly occur, in time.

The Group V operation, it is to be observed, is not an operation to be recommended. It succeeds in bringing about complete intra-gastric regurgitation of bile and pancreatic juice, both of which are powerful stimulants of gastric secretion. Such complete intra-gastric regurgitation stimulates the gastric or second phase of gastric secretion interminably, in consequence of which recurrent ulcers form.

Choice of Operation. These observations afford some helpful clues in the selection of a procedure which will accomplish the primary objective of surgical therapy of ulcer, viz; effectual reduction of gastric acidity. Anastomotic operations, (Group I) as represented by gastro-jejunostomy fail to meet the requirements of a satisfactory operation, in that they fail to reduce gastric acidity. Similarly, extensive excision of the acid-secreting area alone (Group VII) does not satisfy the demands of an acceptable procedure. When, however, extensive excision of gastric tissue, including the antral mucosa, is combined with a gastro-jejunostomy which allows opportunity for some intra-gastric regurgitation (Groups III and IV A), the objective of a satisfactory operation is met in a high proportion of the cases. It appears that sacrifice of 75 to 80 per cent of the stomach is necessary to achieve this objective.

The Indications for Operation. The distinguishing characters of any worthwhile therapeutic measure, are (1) that the objective may be achieved with minimal risk to life (2) that the procedure accomplishes actually what it purports to do.

It is obvious that these fundamental criteria must be weighed carefully in every patient who is advised to have operation. It involves such primary considerations as: (1) who is to do the operation? (2) what operation does the surgeon purpose to perform?

When these questions can be answered to the complete satisfaction of everyone concerned in the decision, the matter of the indication for operation, in most instances, is relative. The three-quarter gastric resection Group III operation, has much to offer the patient who suffers from ulcer distress, and who can not be controlled satisfactorily on medical management.

The Problem of the Gastric Ulcer. Because of the possibility of confusion with malignancy, the gastric ulcer presents a special problem. Everyone who has had any experience in the management of ulcer will admit freely that this distinction can not be made in a number of cases. As Holmes has pointed out, a filling defect in the immediate pre-pyloric zone is likely to be neoplastic. The juxta-esophageal lesion is difficult of accurate identification, and in the experience of this writer, benign lesions with low gastric acidity, not uncommonly attend such ulcers. The lesion on the lesser curvature, above the incisura which becomes smaller or heals out, on bed rest and conservative management is benign, in most instances. Even malignant lesions in this location may, however, respond similarly.

This dilemma of being certain of the real nature of the gastric lesion deserves the studied attention of roentgenologists, internists, and surgeons. Allen of Boston has advocated consideration recently of gastric ulcer as being primarily a surgical problem. Certain it is, that surgeons should have a part in the decision concerning the

choice of therapeutic procedure in such patients.

Preoperative Preparation of the Obstructed Patient and Postoperative Care. Up until now, surgeons have concerned themselves largely with the maintenance of proper water and electrolyte balance and vitamin requirements in preparing patients for, and, caring for them after operation. There are, however, two other items of fundamental concern: (1) Meeting the caloric needs of the patient and (2) Satisfying his nitrogen requirement. The work of Whipple and his collaborators in emphasizing the possibility of maintaining nitrogen balance in dogs by intravenous infusion of plasma alone has opened up a new and practical manner of preparing patients for operation, who present obstruction at the gastric outlet. In this clinic, maintenance of nitrogen equilibrium has been demonstrated upon patients in whom the only source of exogenous intake of nitrogen was intravenous injection of human plasma. Elman has demonstrated, also, the feasibility of supplying nitrogen to patients by the intravenous injection of amino acids. In the experience of this clinic, most of the amino acids available commercially will not maintain nitrogen balance, on intravenous injection, when they constitute the *only source of nitrogen intake.* When, however, a small amount of human plasma which constitutes a complete protein is employed as a supplement to the amino acids, nitrogen balance may be maintained on intravenous injection also.

In the presence of an obstructed gastric outlet, caloric balance may be maintained by the slow infusion of a 20 per cent solution of glucose in a small vein selected in the hand, forearm or leg. A 20 gauge needle and proper fixation of the needle allow quite free movement of the arm, permitting long continued infusion. A minimum of ten hours is employed to administer 1500 cc., to obviate spillage of sugar in the urine.

For a period of two years, this general plan of management has been used in the preparation of patients exhibiting the effects of starvation, for operation.[32] During this interval of time, no two-stage procedures have been done on patients presenting obstruction at the gastric outlet. In a period of ten to fourteen days, patients presenting themselves as extremely poor surgical risks, as a result of gastric obstruction, may be gotten into satisfactory condition for operation, as a rule. Such patients will gain in weight, and strength, the turgor of the skin improves and primary resection can be carried out, whether such patients suffer from ulcer or cancer.

Physiologists have taught, that short periods of starvation are withstood with impunity so long that surgeons have been slow to realize the importance of meeting the caloric requirements of surgical patients. Moreover, surgeons have ignored completely the nitrogen demands of the body.

In this clinic, we have been at pains to meet the caloric and nitrogen requirements, as well as the water, electrolyte and vitamin needs of all patients having major operations on the gastrointestinal canal, throughout the early post-operative period, until the patient can manage well enough by the oral ingestion of food alone. The task, which one imposes upon the intramural staff of an active hospital service in carrying out this plan, is immense and can be appreciated fully, only when one has striven to accomplish this objective. The time is not far distant, this writer believes, when the great importance of meeting adequately the nitrogen caloric, as well as water, electrolyte and vitamin needs of patients, will be accepted as fundamental in carrying through major surgical procedures with minimal mortality. Perfection of surgical technique and proper care of the patient, before and after operation, will extend surgery to an increasingly larger number of patients who may benefit by its accomplishments.

The writer has stressed elsewhere the importance of not overhydrating patients who are poor surgical risks, especially patients in the upper age brackets with poor cardiac reserve.[32] Oliguria, in the early postoperative period, has been an uncommon experience, with the administration of reasonable amounts of fluid, with the use of 20 per cent glucose solution to meet the caloric requirements of patients. Use of the bed-side weighing scale, before and after operation, has proved an indispensable adjunct in the control of the status of hydration.

The shock-frame and the Trendelenburg position, to support blood pressure; indwelling gastric suction before, during, and after operation, and free use of an electric aspirator to keep the throat dry during the recovery period, to obviate regurgitation of mucus, as well as gastric con-

tent, into the lungs during the recovery period are items of *first* concern in conducting a patient safely through the hazards of an operation. Only a *planned* procedure can anticipate and avert the numerous possibilities for accident or difficulty in an operation.

The Operation. The closed method of gastric resection has been used exclusively in this clinic now for about three years.[30] It presents some advantages which lie outside the province of this paper to discuss. The Group III operation, performed on the Hofmeister plan, is the operative procedure of choice.

The special technical considerations, which need the attention of the surgeon in the performance of the Group III operation are: (1) Safe closure of the duodenum; in those instances presenting unusual difficulties, salvage of the seromuscular portion of a small width of the antrum, with excision of the antral mucosa may simplify the problem; (2) The establishment of a stoma which permits filling from the afferent jejunal loop and emptying through the efferent without evidence of obstruction.

Obstruction of the efferent outlet has ruined many an otherwise satisfactory procedure. Surgeons complain of the many causes which may initiate its occurrence. The site and size of the stoma, as well as the length and direction of the afferent loop and hypoproteinemia, are the factors which have received most notice as being the causative agents. The experience of this clinic, in the making of gastro-jejunal stomas, suggests that in the majority of instances, obstruction at the efferent outlet is of the surgeon's *own making*. Striet adherence to utilization of not in excess of ½ to ¾ cms. of the jejunal and gastric wall in making the apposition will preclude its happening. If the surgeon employs too much of the adjacent intestinal and gastric wall, a mucosal flap covers over the efferent outlet and interferes with emptying. No mythical causes need be sought to explain its occurrence. Better technique, on the part of the surgeon, will eliminate the necessity for secondary procedures aimed at its correction.

Obstruction to the afferent loop, though not so well known, is undoubtedly, a potentially more serious complication. A mucosal stomal flap is not as likely to be responsible for its occurrence, for such a flap would be elevated and displaced by the pressure of the contents of the proximal jejunal loop. Angulation of the proximal loop, at the gastro-jejunal stoma is the likely cause. And the serious aspect of the matter is, that obstruction here makes of the duodeno-jejunal loop, a closed obstruction. Insomuch as the vessels, in this section of the gut, penetrate the circular muscle of the bowel wall, immediately on leaving the mesenteric pedicle of the bowel, and disperse themselves submucosally over the periphery of the bowel, relatively slight increases in intraluminal tension will bring about serious and tragic consequences. In order to obviate increases of intraluminal tension in the proximal loop during the early convalescent period, the writer has employed a forked type of inlying gastric tube. (Figure 4) At the time of operation, one fork is placed into the afferent and the other into the efferent loop. Since this procedure was invoked a year ago, no obstructions at the gastro-jejunal stoma have been observed, during which time more than one hun-

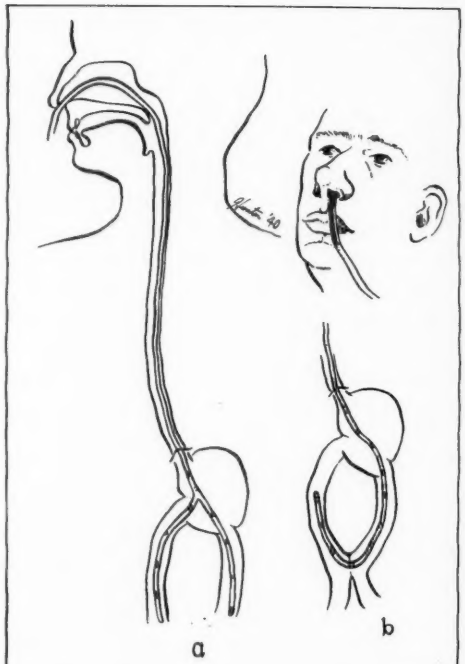

Figure 4. Forked type of inlying gastric tube employed after gastric resection to avoid stasis in the proximal duodeno-jejunal loop. (Available through the V. Mueller, Company, Chicago.) Reproduced from Surgery, Gynecology and Obstetrics, February 15, 1941. Vol. 72, 257-281.

dred patients have been submitted to gastric resection for the relief of cancer and ulcer.

The difference between success and failure is often only a hair's breadth. Yet the difference between a live and a dead man is no trifle. There can be no doubt, that a surgeon, who strives to achieve a measure of success beyond the ordinary must be a perfectionist. Too often, the follies of our practices are bitter reproaches to the utterances of our lips and the wisdom expressed in our plans.

Results of Operation (Group III Operation). The experience of this clinic in more than 100 consecutive operations suggests that the three-quarter resection for ulcer may be done with a 2 per cent mortality for gastric and duodenal ulcer, including the complications of hemorrhage and obstruction, and gastro-jejunal ulcer from a previous gastro-jejunostomy. The risk in the gastric malignancy group, essentially because of concentration of the patients in the upper age brackets, carries a risk of approximately 10 per cent.

Patients who accept operation, which succeeds in reducing gastric acidity effectually, are a pleased group of patients. They are free from pain and are rid completely of the ulcer diathesis. If the patient is achlorhydric, there will be no recurrence of ulcer. It is to be admitted, however, that no operation has been found that will make 100 per cent of patients consistently achlorhydric to maximal stimulation (1½ mg) with histamine. Yet, the successes in the Group III operation, from the standpoints of reduction of acidity as well as freedom of recurrent ulcer, are so satisfactory, as to suggest that it is an acceptable therapeutic measure in the surgical management of ulcer.

Inasmuch as the patients are largely achlorhydric, they may eat anything, without dietary restrictions. This is very welcome news to a group of patients, who have been denied a large number of inviting foods. Because of the small gastric capacity, patients, who accept the three-quarter resection, find it necessary to eat often for a few weeks or even a few months. The fundic portion of the stomach, however, is capable of a good deal of stretch and, in time, such patients have an adequate gastric capacity restored.

SUMMARY AND CONCLUSIONS

Ulcer is a common cause of disability. It takes, also, a fairly large toll of lives. On the basis of clinical observations, supported by good experimental evidence, it would appear that *acid is the important factor in the genesis of ulcer.* Chronic perforating ulcers may be reproduced in a variety of animals by stimulating the intrinsic secreting mechanism for the production of acid by histamine.

Inability to control gastric acidity effectually is the chief cause of failure in the medical management of patients, who suffer from ulcer. Night secretion contributes materially to failure of dietary control of gastric acidity.

Effective reduction of gastric acidity is also the chief criterion of an acceptable operation, directed at relief from ulcer. Anastomotic operations, as represented by gastro-jejunostomy, fail to reduce gastric acidity, and are not to be recommended in the surgical management of ulcer. The most acceptable procedure, in the light of the surgeon's objective of effectual reduction of gastric acidity, appears to be the three-quarter gastric resection, with sacrifice of the pylorus and antrum, accompanied by a satisfactory gastro-jejunal anastomosis. The writer establishes gastro-jejunal union, after resection, by the closed (aseptic) method of anastomosis, and prefers the Hofmeister plan of operation. The anastomosis is made in an anti-peristaltic fashion and is invariably retrocolic.

Consistent achlorhydria has been achieved in 65% of patients by the Group III plan of operation, to maximal stimulation with histamine; 80% have been achlorhydric on all but one examination. No recurrent ulcers have been observed after this type of operation. No dietary restraints are imposed on these patients. Restoration to useful activity, freedom from distress and ulcer recurrence, and a normal diet are measures which recommend this procedure. The experience of this clinic suggests that the operation may be done for ulcer and its complications (exclusive of perforation) with a risk of 2%.

The importance of maintaining caloric and nitrogen equilibrium in poor risk patients is stressed. By intravenous feeding, the patient with obstruction at the gastric outlet may be prepared for operation and have the one stage procedure performed, as is done in standard

risks. It is equally as important to maintain caloric and nitrogen balance during the recovery period. Acceptance of these measures by surgeons will extend the accomplishments of surgery to poor risk patients, without increasing materially the operative risks, beyond those assumed by standard risk patients.

BIBLIOGRAPHY

1. Allen, A. S., and Welch, C. E.: Gastric Ulcer: The Significance of this Diagnosis and Its Relation to Cancer. Transactions, American Surgical Association, 1941.

2. Allen, A. W., Benedict, E. B., Acute Massive Hemorrhage From Duodenal Ulcer, Annals of Surgery, 98: 736-749, 1933.

3. Bergh, G. S., Hay, L., and Trach, B.: Peptic Ulcer, Bulletin, Staff Meeting, University Hospitals, Minnesota, 11: 282-305, 1940.

4. Carlson, A. J.: The Control of Hunger in Health and Disease. Chicago University of Chicago Press, 235, 1916.

5. Church, R. E., and Hinton, J. W.: The Results of Gastro-enterostomy in Gastric and Duodenal Ulcers. Surgery, 7: 647-756, 1940.

6. Code, C. F., and Varco, R. L.: Chronic Histamine Action, Proceedings Society Experimental Biology and Medicine. 44: 475-477, 1940.

7. Dragstedt, Lester R., Vaughn, Arkell M.: Gastric Ulcer Studies, The Resistance of Various Tissues to Gastric Digestion, Archives of Surgery 1924-viii, 791.

8. Edkins, J. S.: The Chemical Mechanism of Gastric Secretion. Jour. Physiology, 34: 133, 1906.

9. Elman, R.: Parenteral Replacement of Protein with the Amino-Acids of Hydrolyzed Casein, Ann. Surg. 112: 594-602, 1940.

10. Emery, E. S. Jr., and Monroe, R. J.: Peptic Ulcer; Nature and Treatment Based on Study of 1,435 Cases. Arch. Int. Med. 55: 271-292, Feb. 1935.

11. Emery, E. S., Jr. Monroe, R. J.: Causes of Death in Patients with Peptic Ulcer, New England J. Med. 217: 729-730, Nov. 4, 1937.

12. Finsterer, H.: Operative Treatment of Severe Gastric Hemorrhage of Ulcer. Lancet 2: 303, 1936; Surgical Treatment of Acute Profuse Gastric Hemorrhage, Surg., Gynec. and Obst. 69: 291-298, 1939.

13. Goldman, L.: Gross Hemorrhage From Peptic Ulcer: Its Morbidity, Mortality and Treatment, J.A.M.A. 107: 1537, 1936.

14. Gordon-Taylor, G.: The Problem of the Bleeding Peptic Ulcer, British Jour. Surg. 25: 403-425, 1937.

15. Graham, Roscoe — Discussion of Bleeding Ulcer at American Surgical Meeting, April 1941.

16. Hay, L.; Lynn, David: Wangensteen, O. H.: The Production of Gastric and Duodenal Ulcer in Various Animals by the Intramuscular Implantation of Histamine in Beeswax; The American Society for Experimental Pathology, Chicago Meeting, 1941. (Abstract) Transactions, Page 12.

17. Hellebrandt, F. A., Tepper, R. H., Grant, H., Catherwood, R.: Nocturnal and Diurnal Variations in the Acidity of the Spontaneous Secretion of Gastric Juice. Am. Jour. Digest. Disease and Nutrit., 3: 477-481, 1936.

18. Holmes, G. W.: Hampton, A. O.: The Incidence of Carcinoma in Certain Chronic Ulcerating Lesions of the Stomach. J.A.M.A. 99: 905, 1932.

19. LaDue, J. S.: The Treatment of Massive Hemorrhage, Due to Peptic Ulcer, J.A.M.A. 113: 373-377, 1939.

20. Madden, S. C.; Whipple, G. H.: Plasma Proteins: their source, production and utilization. Physiological Review, 20: 194-217, April 1940.

21. Mann, F. C., and Williamson, C. S.: The Experimental Production of Peptic Ulcer. Annals of Surgery, 77: 409-422, 1923.

22. Matthews, W. B. and Dragstedt, L. R.: The Etiology of Gastric and Duodenal Ulcer, Surg., Gynec. and Obst., 55: 265-286, 1932.

23. Meulengracht, E.: The Medical Treatment of Peptic Ulcer and Its Complications, Brit. M. J. 2: 321-324, 1939.

24. Palmer, W. L.; Nutter, P. B., Peptic Ulcer and Achlorhydria; further study of role of acid gastric juice in pathogenesis of peptic ulcer; Arch. Int. Med. 65: 499-509, March 1940.

25. Pavlov, I. P.: The Work of the Digestive Glands, 2nd Ed., London, Griffin Company, 1910.

26. Schiffrin, M. J.: Experimental Ulceration of the Gastrointestinal Tract, Proc. Amer. Physiol. Soc. 1941, P. 249, Chicago Meeting.

27. Varco, R. L.; Code, C. F.: Walpole, S. H., Wangensteen, O. H.; Duodenal Ulcer Formation in the Dog by Intramuscular Injections of a Histamine Beeswax Mixture. Proc. Amer. Physiol. Soc. 1941, P. 287, Chicago Meeting.

28. Walpole, S. H., Varco, R. L.; Code, C. F., and Wangensteen, O. H.: Production of Gastric and Duodenal Ulcers in the Cat by Intramuscular Implantation of Histamine. Proc. Soc. Exper. Biol. & Med. 44: 619-621, 1940.

29. Wangensteen, O. H.: A Physiological and Surgical Critique of the Surgeon's Role in the Management of Ulcer (Duodenal and Gastric). The Bulletin of the Minnesota Foundation, November, 1940.

30. Wangensteen, O. H.: Aseptic Gastric Resections. I. A Method of Aseptic Anastomosis Adaptable to any Segment of the Alimentary Canal (Esophagus, Stomach, Small or Large Intestine). II. Including Preliminary Description of Subtotal Excision of the Acid-Secreting Area for Ulcer., Surg., Gynec. and Obst., 70: 59-70, 1940.

31. Wangensteen, O. H.: Problem of Surgical Arrest of Massive Hemorrhage in Duodenal Ulcer; Technique of Closing the Duodenum, Surg. 8: 275-288, August, 1940.

32. Wangensteen, O. H.: Aseptic Gastric Resections in the Gastrointestinal Tract, with special reference to resection of the stomach and colon; Surg., Gynec. and Obst. 72: 257-281, February 2A, 1941.

33. Wangensteen, O. H.; Varco, R. L.; Hay, L.; Walpole, S.; and Trach, B.: Gastric Acidity Before and After Operation Procedure with special reference to the role of the pylorus and antrum: a preliminary report of a clinical and experimental study, Ann. Surg. 112: 626-670, October, 1940.

34. Winkelstein, A.: One Hundred and Sixty-Nine Studies in Gastric Secretion During the Night. Am. Jour. Digest. Dis. and Nutrit., 1: 778-782, 1935.

MEDICAL CARE OF SOCIAL SECURITY CLIENTS*

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There are several factors that enter into a discussion of this subject. A thorough knowledge of the principles that govern the administration of relief and Social Security clients would help to clear up some of the confusion and misunderstanding that has developed throughout the country among physicians regarding the care of Social Security clients. The chief difference in planning medical care for these people lies in the statute that limits how procedures can be done for Social Security clients. In considering these facts we should remember that the past eleven years have

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brought many necessary legislative changes, national, state and local, relative to providing funds for the care of the poor.

We should likewise remember that in the beginning of the depression federal legislation known as Federal Rules and Regulations No. 7, made provision for medical care when setting up programs for relief. In these programs the clients were to have the free choice of physicians. This being a national ruling it was incorporated in most of our state programs and has proven to be one of the most constructive measures adopted relative to the care of clients on relief. It is no doubt confusing to many physicians who have rendered care to Social Security clients that they are not governed by the same principles.

It should be stated that during the interim since the depression, strategic efforts have been made throughout the country by people interested in the welfare of the indigent to try to secure employment for this vast army of unemployed. Systematic efforts were made to study them and classify them into categories. Notations were made as to their age, sex, health, occupation, handicap, employability, financial assets and responsibilities. Many were employable. Some, because of varied handicaps, were unemployable. Noticeably outstanding in this group throughout the country were the aged, the blind and the dependent children, for whom the only future was the poor-farm. It was with the hope of removing these three groups from the poor-farm and institutions and providing them with the necessities of life that they were included in the Social Security act when it was signed on August 4, 1935.

In order for the different states to participate in the Social Security Act it became mandatory for them to pass enabling laws to conform to the different categories of the Social Security Act. Many of these laws differ in their objective in that they have been so constructed as to meet the demands of a particular state. These laws may vary in different states because of geographic location, industry, employment, type of population, number and type of clients involved, the funds required and the state's previous taxes and obligations, the fact that many communities are slow in accepting the dogma that Social Security should not only include provision of shelter and sustenance but also that of good medical care. All of these factors may influence the construction of a state's enabling laws and their program for medical care.

The federal and state laws, while conforming in principle, differ in their function. The federal act defines eligibility and while the federal government matches the state's funds for assistance dollar for dollar, it specifically states that there shall be no matching of funds where the money is paid to anyone other than the recipient. The state law is responsible for the administration and operation of a program for the care of Social Security clients in that state.

There remain at this time about five states, of which Illinois is one, that have not as yet passed enabling acts covering the aid to dependent children and the blind. Legislation of this type is compulsory if these five states desire to participate in each of the categories of the Social Security Act. Their delay defers organization, administration and operation of any plan until their legislative program has been completed.

The practical application of the principles of these laws once they become a part of the statute of the state still remains a gigantic problem to organize, administer and finance before they can benefit the clients. This is noticeably greater in some states than in others. It is obvious that certain agricultural states with a scattered population would have fewer clients and less obligations than those states with large metropolitan areas, as well as leading industries which tend to concentrate the populace and incidentally increase the number of dependents.

In some instances supplementary legislation will be required to change some of the present laws regulating the Social Security Act as well as to develop additional funds for a medical program. The question of how to develop a good program for the medical care of Social Security clients within the present status of the Social Security Act is a problem that cannot be done in most states without many handicaps.

It is my belief that a practical example of some of the problems that the Social Security Act present may be more readily determined by a review of some of the pertinent factors in the State of Illinois.

In aid to the blind, the government grants to the state an amount equal to half the assistance payment to each individual up to the federal total of $40 per month; also approximately one-half the cost of administering the state plan

The total number of blind in Illinois in February 1941 was 7688, of which 2281 were in Cook County and 5407 downstate.

In aid to dependent children, the government grants to the state an amount equal to one-half the cost of the assistance for each dependent child up to the federal total of $18 for the first child, $12 for the second and each additional child, and pays approximately one-half the cost of administering the state plan.

In this state we have a mother's pension passed in 1911. A total of 7453 mother's pensions were issued in Illinois during February for the care of 16,492 children (4014 children in Cook County).

The Old Age Assistance has no doubt shown the greatest activity of any of the categories in its organization and administration. In the month of February 1941 there were 143,482 applicants certified for assistance. It is probable that few people realize what it costs to serve that number of aged persons. During the year 1940 assistance granted to this group required almost double the amount of money that it took to operate all the other 27 state Public Welfare Institutions with their 55,000 inmates and 12 divisions, and other services of the Department of Public Welfare.

The Department of Public Welfare operates these 27 institutions and all their services for just under seventeen million dollars a year. The Old Age Assistance alone cost almost $30,000,000 during the fiscal year ended June 30, 1939. At the present rate of increase in expenditures, Old Age Assistance will soon cost substantially twice the amount of money it takes to operate the rest of the Department of Public Welfare. The general trend in the history of the Division has been toward a larger number of recipients at a larger average per month.

The trends in the population and their affect on Old Age Assistance program are increasing, because the number of persons in the state 65 years of age and over is increasing. The aged of the state number over 421,000 in 1930; today there are more than 515,000 persons 65 years of age and over. It is estimated that in 1960 there will be 931,000 persons 65 or over. Each aged person is a potential applicant for Old Age Assistance.

The Division continues to be faced with two major problems in the area of eligibility and service, namely (1) the question of medical care, and (2) how to administer it.

The Division of Old Age Assistance has partially met the medical needs of the recipients. The degree to which these needs can be met within the present Old Age Assistance Act is definitely limited. The federal Government matches dollar for dollar the states funds for assistance only when payments are made in cash direct to recipients. It will not match funds paid by the Division to anyone other than a recipient. The state is also limited to the extent to which it can meet medical care needs because of the specification in the Old Age Assistance Act. In this instance the Department of Public Welfare of the State of Illinois and the Advisory Committee of the Illinois State Medical Society are busy attempting to amplify a program for medical care for this group within the present statute. We are, however, confronted with the following limitations in regard to providing medical care. The facts are:

1. Payments to professional practitioners and vendors cannot be guaranteed by the state agency.

2. The amount of payment is limited by the maximum award of $40 per month, i.e., if a recipient's basic award as determined by his need for food, shelter, clothing, fuel, etc., is $32 per month, the amount budgeted for medical care cannot exceed $8.00 per month.

3. There can be no control of the kind or cost of medication or supplies purchased by the recipient. Even though a change of award may be based on a given need for an approved medication, the recipient may, when he receives his grant, use it for another form of medication.

In more instances when the payment of the medical fee is made direct to the recipient it is retained by him or her as a part of his monthly grant, by which instance the physician is not paid for his medical services.

It is generally conceded by the majority of people who have studied the practical application of the Social Security Act, that if it is to achieve the things it was designed to accomplish, supplementary legislation, either federal or state, will be required to make the Act more flexible and to provide additional funds before a program for good medical care can be instituted.

It is stated that the Social Security Board is

planning to propose amendments to Title I of the Social Security Act.

1. These changes concerning medical care would permit direct payment by the Assistance Agency to a practitioner or vendor for medical services or supplies given to a recipient of Old Age Assistance. A fund for medical care would be established by the state by allocating a maximum of $1.50 per month per recipient, with the federal government matching half of the amount. The law would be implemented by rules and regulations established by the Social Security Board which would define medical care in very liberal terms and which might include care in public hospitals and convalescent homes.

At present the federal government adds to the state's allocation for Old Age Assistance five per cent of this total sum, to be used for administrative costs. This would be changed so that matching for administrative cost will be on the same basis as matching for assistance payments or

Appropriation of state funds, unmatched by federal funds, to provide for medical care and to be used to pay the source of medical aid direct, under a fee-for-service plan. This would also help to solve the problem in Illinois. However, the probability of this is doubtful at the present time because of our taxes which by reason of relief and Old Age Assistance are prohibitive.

In the interim the Division of Old Age Assistance of the State Department of Public Welfare is trying to cooperate with the medical profession in Illinois by sending the recipient a notice to the effect that the extra amount of money in his grant for that month is for the purpose of paying his physician for the services he has rendered. It is hoped that by this method it will be possible for the physician to be remunerated for the medical service he has delivered.

It is the consensus of opinion that one of the chief objectives of the Social Security Act was to provide its clients with the necessities of life, which should unquestionably include proper medical care. Thus the problem of how to provide good medical care to Social Security clients is rapidly becoming a major question with the Department of Public Welfare of most of our states.

While the requirements for medical care for these three categories may differ somewhat in detail, in a general way they can be very well provided for under one carefully organized program which would give special consideration to the needs of each category. The practical application of principles governing medical care in rural and urban communities with the available facilities will necessarily need to be carefully developed.

The very valuable information and experience that have been collected during the past seven years in some of the best organized metropolitan and rural programs for the medical care of the indigent should be invaluable in helping to provide a workable program.

In reviewing the incidence of disability among social Security clients experience demonstrates that it is more frequently due to diseases of the cardiovascular, respiratory, gastro-intestinal and neurological systems, arthritis, injuries, fractures, malignancy of the skin, gastro-intestinal and genito-urinary tracts, malnutrition, diseases of the skin, bones, eye, ear and mouth. Statistics also indicate that one out of every two persons sixty-five years of age or over has some chronic ailment or physical disability, and that one out of every eight in the Old Age Assistance group is bedridden or requires considerable care from others. It should likewise be noted that the morbidity rate is high; that illness is unpredictable as is the duration of care.

In a survey of a large series of a group of these cases in New York City they classified them into three groups, (1) those that required medical care for diagnosis and treatment, whether in a hospital, office or clinic; (2) those who needed, under medical direction, unskilled care by an attendant or member of the family; (3) those who needed chiefly skilled nursing care under medical direction.

My experience during the past seven years as Chairman of the Advisory Committee of the Chicago Medical Society to the Chicago Relief Administration has been that the best medical care is provided when the client can choose his physician and thereby maintain the patient-physician relationship. I also believe that because of the age of this group, their illnesses, infirmities, poor vision and hardships of transportation, the physician's office should be used in preference to clinics when possible for ambulatory patients; that clinics should be used only when physicians or advisory committee recommend such for special diagnostic work.

It is my belief that there should be an organized medical care program to meet the special needs of clients of the Social Security Act; that these programs should be drafted by a joint committee consisting of representatives of the Divisions of the Department of Public Welfare and a carefully selected advisory committee of the State Medical Society; that a special administration unit of the Department of Public Welfare should be responsible for administering the program on an efficient basis.

The program should provide:

For the acutely ill:

1. Hospital care
2. Ambulatory care by family physicians. Clinics only when referred by physician or committee
3. Home care including physician and visiting nurse service
4. Drugs, special diets and appliances

For the chronically ill:

1. Institutional care
2. Ambulatory care
3. Home care including physician and visiting nurse service
4. Drugs, special diets and appliances

For convalescent care:

1. Institutional convalescent care
2. Home convalescent care

Dental care should be provided on a selective basis.

In closing I wish to express my appreciation to Mr. Fletcher C. Kettle, Superintendent of the Division of Old Age Assistance of the State of Illinois; Miss Pearl Bierman, Medical Social Consultant, Department of Public Welfare, State of Illinois; Mr. Wallace Clark, Assistant in the Division of Old Age Assistance.

In conclusion:

1. It is my opinion that there should be a program for medical care of Social Security clients.

2. There should be free choice of physicians.

3. That the Social Security Act should be changed to make the administration of this program possible.

4. That said program should be supervised by an Advisory Committee of the State Medical Society.

30 N. Michigan Avenue

DISCUSSION

Question: Do you think there is any special program that will work down in southern Illinois without a lot of work on the part of the local physicians?

Dr. Phifer: My answer to that question is yes. Either of the present public assistance programs in this state will work in any community providing the physicians rendering medical service to the clients cooperate by following the rules and regulations that govern these programs. We should remember that all of these recipients are indigent regardless of the classification. In providing these programs the objective was to provide for the necessities of life, namely, food, clothing, shelter and medical care. These programs are all based on legislative action which defines the recipients, how these necessities are to be provided, and the amount of money for a given time. It likewise states how they shall be administered, and presupposes that they will have an efficient business administration. The majority of them are controlled programs. They must necessarily be governed by policies which regulate and control their expenditures. The amount of clerical work required of the medical profession varies with the types of program, and also the procedure for remuneration. The compensation for medical service is based on indigent care. The legislative act governing the program may complicate the flexibility of the administrative body. This is especially true with the Social Security Act. In each of these programs I would like to see all the recipients have free choice of physicians. Participation in these programs should be optional with the physician. It is my desire to set up a Medical Advisory Committee in each county of the state. All medical problems pertinent to these programs in that county should be referred to this Committee. These county committees should coordinate through the State Central Committee.

Question: Does the Old Age Assistance have any way of checking up to see whether these people spend their money for medical care?

Dr. Phifer: They try to do so. I would like to repeat that the Social Security Act definitely states that the money must be paid to the client and to no one else. The latter is not satisfactory either to the members of the medical profession, the Department of Public Welfare or to the members of the Social Security Board. We are informed that the latter is contemplating some change in the Social Security Act that will make possible the payment for medical service direct to the physician.

I would like at this time to introduce Miss Pearl Bierman, Medical Social Consultant of the Department of Public Welfare of the State of Illinois. I will ask her to continue this discussion.

Miss Bierman: The Social Security Act provides that it is the state's responsibility to determine the client's needs. Once having determined that need, we make an unconditional cash payment to him. If he wants to spend that money all in one area that is his responsibility. There is nothing we can do about

insisting that he pay any one person rather than another.

Question: What happens if the physician reports that this money was not paid to him?

Miss Bierman: Then we assume that the client does not have a medical need and we change the amount given him.

CORONARY DISEASE AND THE DOCTOR

O. P. J. FALK, M.D.
ST. LOUIS

That coronary disease is taking a disproportionate toll from the ranks of medical men is the impression obtained by many of us from our experience with doctor patients and contacts. This impression is strongly confirmed by mounting statistical evidence. Life Extension Examiners[1] report a general increase of 114% in coronary deaths among men over a seven year period. Coronary mortality among physicians during this same period rose 240%, more than twice the general male increase. The average mortality age has not increased sufficiently during the past decade to account for such a startling increase, and it is questionable whether there has been sufficient increase in diagnostic acumen to account altogether for this striking change. There is reason to believe that the early part of the last decade was influenced by the fashion in diagnostic trends, because strangely enough a separate classification for coronary occlusion or thrombosis does not appear in A.M.A. summaries until 1934. Previous to this time, coronary deaths were included under "angina pectoris," or "other diseases of the heart." Just what are the factors concerned in this general increase of coronary disease? Why is our profession particularly susceptible? Is it perhaps that we are subjected to a greater degree of unrelenting strain and responsibility? Are the less vigorous physical living habits of today detrimental to our coronary welfare? Is irregular rest with the attendant fatigue that so characterizes the physician's lot a significant factor? What role is played by the increased use of tobacco? Of what importance are nutritional factors in general and our habits of eating in particular? Are we directing proper attention to the matter of conserving our hearts by using our heads? Are we avoiding or at least minimizing such influences as may invite early cardiovascular decay? Such considerations as these are indeed thought provoking and should serve to arouse us from a state of fatalistic resignation to an attitude of thoughtful inquiry into the lives and habits; into the physical, mental, and emotional hazards encountered by the average physician in the course of his professional career.

From the Department of Internal Medicine of the St. Louis University School of Medicine.

Read before General Session of Illinois State Medical Society, May 22, 1941, Chicago

Typical case report

A 51 year old physician presented himself during the past month for examination and advice for a rather typical angina of effort of 2 or 3 years duration. Although the objective findings were essentially negative, the character of the pain, its distribution, its relationship to effort and stress justified the diagnosis of coronary disease with angina of effort. A half hours' conference revealed the following errors of omission and commission to which he was needlessly subjecting himself.

1. He had noted improvement with dietary restriction and coincidental weight loss a year previously. This he failed to heed and was enjoying a high caloric diet with large meals and incidental regain of weight with aggravation of his anginal pains.
2. He failed to follow through the observation that curtailment of cigarette smoking had helped him appreciably during one extended period of time.
3. He had noted that long drives increased his attacks, yet he continued to make them without thought of being driven or making his extended journeys by railroad.
4. He was the tense type of motorist — he chafed at the bit at stop and go signs, and always drove up to a stop sign instead of coasting up to it. He had never practised relaxed driving.
5. His garage situation was such that it entailed considerable manipulation to get his car out of the garage in the morning, and usually resulted in bringing on an anginal pain, but he never thought of leaving his car in the driveway over night. In other words he thought more of his car than of his heart.
6. He was a high-strung type of individual who overreacted to circumstances. He admitted that a triple bromide tablet which he had occasion to take on 2 or 3 occasions seemed to smooth out the day for him and diminished the number of attacks. Yet he never thought of taking a mild sedative regularly.
7. He volunteered the statement that he wished the week contained more Sundays. He stated that he stayed in bed an hour later on Sunday and that seemed to improve the situation in spite of the fact that the day would oft entail considerable work. Confronted with his disease, how logical it would have been for him to *make* more Sundays for himself, by changing the routine of his life to include a longer rest in the morning. In other words he lived well but not wisely.

Observations similar to the above have been encountered frequently in interviewing physicians. This emphasizes the importance of halting the "all-out" activity of the average physician, after he has acquired the anginal syndrome, as well as indicating the rationale of an attenuated program as middle life approaches, in an effort to prevent coronary disease. It would seem logical to make a survey of the social, vocational, and emotional life of Doctors, and make such adjustments as would seem rational in the interest of their coronary welfare.

Statistics indicate that 40% of all physicians are destined to die of heart disease, and of that number half will develop some phase of coronary insufficiency. Of the 3633 deaths among A.M.A. members in 1940, 40% were caused by heart disease, of which 46% were of coronary origin.

The following table portrays a brief survey of the changes that have taken place in the last decade alone.

CAUSES OF DEATH AMONG PHYSICIANS

Year	Average Age	Total Deaths	All Cardiac Diseases	% of Total	Coronary	% of Cardiac
1940	66.3	3633	1515	41%	691	46%
1939	66.1	3879	1583	40%	676	42%
1938	65.6	3768	1491	39%	588	39%
1937	65.4	3398	1358	37%	387	28%
1936	64.5	3581	1374	38%	318	23%
1935	64.2	3491	1343	38%	366	28%
1934	64.3	3393	1131	38%	256	19%
1933	64.4	3354	1351	33%	107	9%
1932	64.1	3142	1101	38%	127	11%
1931	63.8	2952	1065	39%	114	10%
1930	63.7	2943	1059	35%	109	10%

Careful analysis of this table shows that there has been a 50% increase in cardiac deaths among physicians in the decade between 1930 and 1940, although the average age at death has only increased 2½ years (63.7 to 66.3). Contrasted with this 50% increase from general cardiac causes, is an apparent 600% increase in coronary types (109 in 1930 to 691 in 1940). That this tremendous increase is more apparent than real, and was influenced by a more accurate diagnostic trend toward the middle of the decade, is indicated by the fact that a separate column for coronary thrombosis or occlusion does not appear until 1934, before which all the recognized coronary deaths were designated merely as "angina pectoris." However the last five years, during which this condition has been more generally recognized, shows a steady yearly increase totaling 117% (318 to 691 cases) in this latter five year period. It is doubtful whether there has been any appreciable advance in diagnostic accuracy during this last half decade.

Are there any atenuating influences that might affect this mounting toll from coronary disease, or is it due entirely to the inescapable consequence of senescence in an aging group? This latter assumption can be ruled out by the fact that doctors are not living significantly longer, as indicated by the table. That the fashion in diagnostic trend helps mold these statistics is undoubtedly true, but I do not believe that it adequately explains the undeniable coronary trend of the past five years in particular.

Present Day Concept of the Pathogenesis of Atherosclerosis: — Whatever the cause, atherosclerosis of the vascular system is certainly a form of tissue degeneration. Deposition of calcium in injured tissue is probably a protective mechanism to safeguard the strength of these tissues, and as such is a munificent act of nature. The deposition of cholesterol however, in early atherosclerosis is not protective and may lay the foundation for ultimate disaster. The work of Timothy Leary[2] strongly suggests that metabolic deterioration is an important factor in the production of these atherosclerotic changes. It is evident today that a multiplicity of nutritional and metabolic influences, as well as the cumulative traumata of life, superimposed upon a vulnerable hereditary tendency, are all contributing factors. The solution of this problem has not been given by any convincing set of experiments, but when the answer is found, life will almost certainly be further prolonged. The part played by *nutrition* in the development of vigorous resistance and life extension may be of equal importance to heredity, according to the observations of Sherman[3] who believes that with the addition of food rich in calcium and protective vitamins, the years of active life might be increased 10%, which means about six years. Experimentally it has been shown that a higher than average calcium intake is conducive to better than average health. With a calcium rich diet, in observations over a long period of years, made on white rats, whose metabolism closely resembles that of man, Sherman found that there is an improvement in the utilization of food, better growth, greater adult vitality and a longer period between the attainment of maturity and the onset of senility — with a proportionate increase

in the length of life. It would seem logical to assume that a scientifically planned diet would go a long way toward delaying the ravages of age.

Irvine H. Page[4] in discussing the nature of the chemical changes occurring in atheromatosis, concludes that at least two factors may assist in producing human atherosclerosis. One of these is lipemia, which appears to be particularly important in diabetes and nephrosis. The other factor or factors act in the cells of the arteries themselves, and appear to be initiated, for example, by the strain of prolonged hypertension.

General Factors Significant in the Increase of Coronary Disease. M. C. Winteritz[5] who has been a careful observer and student of coronary sclerosis, feels that coronary disease is not the result of any single factor alone, but represents the summation of all the injuries and stresses of life, including infection, sudden strain, emotional shocks, nutritional defect and certain toxic influences. Sir Thomas Lewis maintains that it is the repeated constrictions, the result of repeated stresses, that eventually traumatize the coronary vessels and produce occlusive changes. Additional factors that suggest themselves as significant include the aging of the population, the generally lessened physical activity, the increased use of tobacco, the greater prevalence of the anxiety state, and the increased incidence of overweight, along with better diagnosis and more accurate reporting. The importance of the great economic crisis with its attendant anxiety, which has been so prevalent during this past decade is probably an important factor. Tobacco is known to produce vaso-constriction in the periphery and there is reason to believe that it may have similar action on the coronaries. This may well become a determining factor in the production of acute occlusion in a person with coronary sclerosis, whose coronary reserve is already greatly diminished. English, Willius and Beckson[6], from an analysis of 1000 coronary cases, report a greater incidence of coronary disease among smokers, especially the group below 50 years of age. The greatest incidence was among the excessive smokers. Raymond Pearl's[7] study indicated that expectation of life of non-smokers exceeded that of smokers, and that average longevity decreased progressively with increasing degrees of smoking.

It is said that a man is as old as his arteries, but would it not be equally sound to say that he is as old as his vision or his imagination? Stieglitz[8] writes "there are many with presbyopic vision who retain the imagination and the enthusiasm of youth." He goes on to say that it must be remembered that the aged are the consequence of aging, and that the pathogenesis of senescence starts in youth, when measures should be taken to anticipate the hazards that are bound to come along the path through life. More can be accomplished for the aging than for the aged.

Accumulating evidence points to the possibility that certain of the atherosclerotic changes occuring in coronary vessels of middle aged subjects may not be the result of a progressive deterioration, but may be an actual acquired disease of the arteries, influenced by certain nutritional and environmental factors. Hurzthal[9] states that atherosclerosis is not necessarily due to senility, but that metabolic, toxic and pressure factors may exert a provocative influence. Cholesterol increases are noted in diabetes and in hypothyroidism, in both of which the incidence of atherosclerosis is increased. Ravinovitch[10] has reported that 85% of diabetics developed atherosclerotic changes in 5 years on the high fat regime that was in vogue during the previous decade, but that with the low fat, higher carbohydrate regime now prevalent, only 28% developed demonstrable arterial changes in a five year period. The observations of Leary are suggestive evidence that nutritional factors, as influenced by the type of diet, may very likely play a role in the production of premature atherosclerosis, so frequently the cause of the tragic, unheralded coronary episodes occurring in the prime of life. It is possible that thyroid extract, potassium iodide and lipo-caic may influence the absorption of cholesterol from blood vessel walls according to the observations of Page[4]. Murata and Katoaka[11] and also Liebig[12] found that simultaneous administration of thyroid along with feeding of cholesterol to rabbits prevented deposition of lipids in the aorta. Turner[13] showed that potassium iodide, as well as thyroid, exerted a protective action, and furthermore prevented the hypercholesterolemia that usually occurred and that there was a relationship between the development of atherosclerosis and hypercholesterolemia. Page[4] states that iodine is not unique in its ability to prevent deposition of lipids, but that large doses of potassium thiocyanate and lipocaic are also reported to be similarly effective in

experimental animals. No evidence is at hand to decide whether iodides are of any value in man, and such medication is as yet entirely on an empirical basis, although sanctioned by time honored clinical practice.

About 30% of the population is overweight, and obesity is conceded to be a contributing factor in the production of coronary disease and myocardial degeneration.

The approach to the solution of the coronary problem is predicated upon factors known to be concerned with the pathogenesis and progression of coronary atherosclerosis. This approach is based upon sound principles of well balanced living, with emphasis on moderation, equanimity, and conservation of energy through the middle and later decades of life.

The Problem of Combating Fatigue. Although we cannot hope to pursue an active career of service and accomplishment without experiencing fatigue, we must nevertheless bear in mind that a well balanced plan of life calls for adequate compensation, and the only compensation for normal fatigue is rest. Irregular rest may not be as important as inadequate total hours of rest, in accounting for the familiar "tired doctor" whose hours of rest are so uncertain and so likely to be interrupted. The doctor's life not only requires ample vacation periods and the cultivation of a hobby, but it calls for brief periods of complete mental and physical relaxation that should be snatched from the pressure of the daily routine. Fatigue should be minimized by the elimination of non-essential work. It would seem advisable to dispense as far as possible, with such things as routine evening hospital rounds and unnecessary evening calls. We should avail ourselves of the telephone for handling many of the necessary details of case management. When evening office hours are essential, a brief relaxation period should break the long day of unremitting work. An extra hour of rest in bed in the morning, following a particularly trying day or an interrupted night's sleep, is extremely helpful and can be utilized as an additional reading period. Mastering the art of driving a motor car without tension means the sparing of much valuable energy.

The Exercise Problem. The average weekly routine of most physicians leaves little time for regular periods of adequate exercise. The time-consuming golf game is all too frequently impractical for many of us. While golf is certainly an ideal form of exercise, there may be substituted equally beneficial outdoor activities such as horseback riding, badminton or regular outdoor walking. It is interesting to speculate on just what influence the replacement of man's former necessity for walking may be having on the increase in coronary disease that we are confronted with today.

Nutritional Factors. It is doubtful whether the irregularity of meals so characteristic of the doctor's life is particularly harmful. Hunger does not pile up waste products. But eating hurriedly and working immediately afterwards is admittedly harmful. The evening office hour, following the principle meal of the day, so often the doctor's lot, very possibly presents a tangible hazard to his coronary destiny. Attention to adequate calcium and vitamin intake is of conceded importance. Naturally the problem of overweight should be largely controlled by the minimum fat and moderate carbohydrate diet that seems justified by current thought on the optimum nutritional needs of middle and later life. It would seem particularly important to eat sparingly when under physical and mental stress.

Judicious Sedation. It is difficult to overemphasize the value of stilling the tempests of a particularly stormy day in the life of the physician possessed of a highly nervous temperament. This measure is all the more important where the anginal syndrome is already present. Ten or fifteen grains of bromide or a quarter grain of phenobarbital will iron out many an otherwise ruffled day. When fatigue mounts up to the point that it prevents restful sleep, an occasional barbiturate is extremely helpful, although I am strongly opposed to the habitual use of any such drug. Not infrequently a prolonged warm bath with a hot drink at bedtime will suffice to produce more restful sleep.

The Value of Selectiveness. There is too little satisfaction and too much grief connected with the continued management of certain difficult, introspective or uncooperative patients to justify the effort put forth in carrying them along. The results are rarely worth the toll taken from our valuable store of energy. The same is true of

the person who is always in a hurry (until he gets into the office). Many of us have learned that people who have most to do and really carry responsibility are likely to be the most understanding of our own time problems.

SUMMARY AND CONCLUSIONS

Statistics indicate that the mortality from coronary disease is mounting steadily, and that this trend is particularly evident among members of the medical profession itself. That this coronary destiny may not be the inevitable toll of an exacting and stressful professional life, but that it may be amenable to the influence of determinable factors, constitutes the constructive optomistic philosophy of this discussion. The hope that some modification of the apparent sentence passed upon us by destiny might be attained by a change in our mode of living and working, as middle life approaches, seems not beyond the possibility of realization. At the advent of middle age, all loads should be lightened, including fewer hours of application to duty, the elimination of non-essential activities, the cultivation of tranquility and deliberation of action, moderation in eating and rational dietary balance; a sensible attitude concerning tobacco and alcohol, the cultivation of friends and hobbies, more frequent periods of physical rest and mental relaxation along with appropriate recreation of the less strenuous sort thereby avoiding sudden and unaccustomed strain on the heart. Such precautions as these seem logical measures to follow for conserving cardiac reserve. Furthermore, it is felt that the adoption of a more tranquil and protective philosophy of life might even serve to neutralize the influence of an unfavorable heredity or a hyperreacting temperament, so that one might reasonably hope to postpone, if not actually prevent, some of the tragic episodes of coronary disease so frequently encountered in the world of today.

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BIBLIOGRAPHY

1. Proceedings Life Extension Examiners, **2**: 3, 113, 1940.
2. T. Leary: Arch. Pathology, **17**: 453, 1934.
3. Sherman, H. C.: Bulletin N. Y. Academy of Medicine 1937 — Volume 13, p. 311 to 323.
4. Page, Irvine H.: (Ann. Int. Med.) **14**: 10, 1747, April 1941.
5. M. C. Winternitz and R. M. Thomas: Am. H. J., **14**: 377, 1937.
6. English, Willius and Beckson: J.A.M.A., **115**: 16, 1327, Oct. 19, 1940.
7. Pearl, Raymond: Science, **87**: 216-217, Mar. 4, 1938.
8. Stieglitz, Edw. J.: J.A.M.A., **116**: 13, 1383, Mar 29, 1941.
9. Hurxthal, L. M.: Surg. Clinic N. Am., **16**: 1505, Dec. 1936.
10. Rabinovitch, I. M.: Ann. Int. Med., **8**: 1436, 1935.
11. Murata and Katoaka: Trans. Japan Path. Soc., **22**: 221, 1918.
12. Liebig, H.: Arch. f. Exper. Path. u, Phar., p. 265-374, 1930.

REMOVAL OF THYROID GLANDS EFFECTIVE IN 2 CASES OF DIABETES INSIPIDUS

Two out of 3 patients whose thyroid glands were removed as a means of treating diabetes insipidus, a comparatively rare disease marked by excessive thirst and profuse and frequent passage of urine containing no sugar, have been relieved of the conditions since the operation was performed more than five years ago, Harry Blotner, M.D., and Elliott C. Cutler, M.D., Boston, report in *The Journal of the American Medical Association* for June 21.

The two men explain that available knowledge indicates "that the thyroid gland is a factor in maintaining water balance and possibly plays a role in the regulation of the intake and output of fluid in patients with diabetes insipidus. It appeared of value to apply this knowledge clinically in the treatment of diabetes insipidus. Consequently, total thyroidectomy was performed in 1935 on 3 patients with diabetes insipidus. This paper reports the results obtained on these patients after a five year interval."

The condition in the 2 relieved patients, men of 27 and 29 years of age was associated with postencephalitic Parkinson's disease (shaking palsy following inflammation of the brain). In the case of the third patient, a woman of 66, who received no relief, there appeared to be no precipitating cause for the disease. The two physicians believe that accessory thyroid tissue is present in this woman, inasmuch as the thyroidectomy had none of the effects that usually follow the operation.

Uterine Bleeding—Functional uterine bleeding rests not upon the basis of disease in the uterus itself, but upon faulty function of the ovary, usually improper ovulation. There are extrinsic factors which also affect the ovarian function and in individual patients with functional uterine bleeding there is usually not a single factor but a combination of both intrinsic and extrinsic factors.

A distinction should be made between initial and acquired uterine bleeding and it is in the latter category that the extrinsic factors will usually be in predominance.—*Long, New Orleans M. & S. J., Oct.* '40.

GENERAL PRINCIPLES OF BEHAVIOR PROBLEMS IN CHILDREN

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It may seem like a far cry from the scientific discussion of arthritis you have just heard to a consideration of the mental hygiene of childhood. Let me remind you that all of those symptoms which are not due to organic disease are signs of a psychologic maladjustment. This pointless statement becomes important when we remember that outstanding and authoritative physicians tell us that up to 50% of the hospital beds in America are filled with patients who do not have organic disease but have psychological maladjustments ("nervous breakdowns"). Let me further remind you that it is generally agreed that these emotional difficulties have their origin in childhood. No one ever became "nervous" after growing up. If we are to get anywhere in the prevention of these conditions, it will be through working out different attitudes towards children and new principles of child guidance. A justification for trying out some new ideas and different conceptions of child management is emphasized by a consideration of the outlook for the children in this country who are 14 years of age and under. Over one million of them will develop mental illness so severe that they will have to be confined in a state institution for a part of their lives. Over one half million will develop behavior difficulties so in conflict with the law that they will be incarcerated in penitentiaries. Untold millions of them will have "nervous breakdowns" so serious that they will be incapacitated for months to years of their lives but will not have to go to state hospitals. The most of them will get married. It has been stated by many individuals, and denied by none, that 80% of marriages are not completely harmonious.

It is not difficult to understand the general principles of the growth and development of children. Let us briefly describe them. Children are born with potentialities for development which determine, in a general way, their growth patterns. The general stature (size), for instance, that a baby will have when he grows up is largely determined before birth. It depends primarily upon his race and immediate ancestors. In order to reach that maximum development with the minimum of danger, the child requires an adequate amount of the proper kind of food and good physical care. If these essentials are not received, rickets, anemia, malnutrition and a lowered resistance to disease may result. These are signs of abnormal physical growth.

In an analogous manner potentialities for the development of intelligence are present at birth. The general intellectual capacity and intelligence characteristics of a person are determined first of all by his heredity. The stimulation of the growth and development of intelligence is influenced by the way the child is reared. Attention, affection and good physical care, with opportunities for play alone and with other children, when he is old enough, followed later by educational advantages in school are the environmental factors which stimulate intellectual growth. If these conditions are not provided, the child's ability to think may not develop as rapidly or as well as it should; he may not be as bright as he should be.

The third potentiality for development which is present at birth is represented in emotions. Just as a child grows physically and intellectually according to fixed patterns, he grows emotionally. From the moment of birth an individual responds to every situation in terms of feeling and action. In feelings and emotions we see the manifestation of instincts. As such they may be traced back to earliest mankind. Deeply buried in the unconscious mind, they give rise to the wishes and strivings of life. The fulfillment of those wishes and strivings gives rise to pleasures and satisfaction.

There is already present at birth a well developed and functioning mechanism for emotional response. Every sensation is pleasant or unpleasant to the baby and he responds accordingly. During the first weeks of life at least behavior is almost entirely automatic. The baby acts the way he feels. As the brain develops and experiences are encountered, this behavior is altered and we see the beginning of habit formation. In that advance appears one of the most remarkable characteristics of the human mind — the ability of the baby to adapt himself to his environment.

If one places a newly born child on a pillow and rapidly lowers it, so as to give a sensation of

Presented at Post Graduate Conference, Bloomington, Illinois, — 1940.

falling, the child thrusts his arms forward, all of his muscles become tense, and he cries. The same reaction is elicited by loud noises (after the first day or two, or as soon as the mucous is absorbed from the middle ear), sudden jarring of the bed, hunger and pain. Within the first few days, if not at the outset, the same response is evoked by restriction of movements. In other words, we see that the baby protests against unpleasant experience by crying. These responses may be considered as emanating from the instinct of self-preservation.

The response described above continues throughout life. This crying of the baby becomes the temper tantrum of the older child and a part of the life-long fight for independence. As such it represents some of the strongest impulses responsible for human behavior. Each individual thinks more of himself than of anyone else in the world — with, however, certain exceptions to this general statement which will be described later. Sudden loud noises continue to disturb individuals throughout life. The same is true of the sense of falling and restriction of movements.

In a child's early infancy it is impossible to recognize all of the primary emotional responses, or to distinguish one from another. The cry caused by the sensation of falling, for instance, as has been pointed out by Mandel Sherman, cannot be distinguished from that occasioned by loud noises. As the baby grows and emotional patterns develop, however, it is possible to perceive different emotional responses and the conditions which stimulate them. We find that under certain conditions the child feels scared, resentful or hungry and cries accordingly. The demand for love and attention is evident from the beginning.

With exception of the fears occasioned by loud noises, sense of falling and restriction of movements, specific fears are not inherited. The mechanism for response present from birth, however, is accompanied with a feeling of fear. This response is stimulated by any threat to the preservation of the individual. If one sees an automobile coming toward him and there is danger that he cannot get out of the way, he feels scared. Uncertainty stimulates fear. It has caused part of the apprehension which most of us have felt because of economic conditions for many years. The seriousness of the depression has not frightened people nearly as much as its uncertainty. How long will it last and where will it end? Are we headed towards Communism, Fascism or some other "ism?" Until these questions are answered, apprehension will continue. Whenever children are surrounded by uncertainty they are scared. In an analogous manner, lack of security and confidence stimulate fear; uncertainty, lack of security and need for confidence are threats to self-preservation.

In growing up, children hate anybody or anything that interferes with their pleasures. Adults who do not like to use the word "hate" may substitute the term "resent." From earliest infancy the baby is disturbed (anxious, frightened and resentful) when he does not receive sufficient love and security. More concrete evidence of this is observed between the sixth and eighth months of life. The baby then protests when a stranger picks him up. He actually is remonstrating at any attempt to separate him from his mother or family. He cries for the same reason when examined by the physician rather than because of any inoculations administered at the time.

Under certain conditions the baby feels hungry. This feeling is caused by the need of the body for food and, like the emotional response described, is important from the standpoint of self-preservation. It is impossible to keep from becoming hungry. In the same way, feelings of fear and hate cannot be prevented when the conditions which stimulate them are present.

The emotional responses already discussed have to do with unpleasant feelings. If we return to the nursery and observe the baby further, we find that under other conditions he has pleasant feelings; he derives pleasures from other experiences. He will stop crying when fondled, unless he is in pain. He derives pleasure from many sensations, especially from the normal functions of the gastro-intestinal tract; i. e., sucking, the satisfaction of hunger and elimination. Those who doubt the pleasure derived from eating and elimination can be readily convinced by observing babies. There is no more perfect picture of satisfaction and contentment than that of a baby with a full stomach, who has nursed as long as he likes, and is free of colic. A similar picture is seen following a bowel movement.

Since the emotional demands of the baby are

supplied by his mother, we see him completely dependent upon her and becoming attached to her emotionally. This emotional reaction gradually changes with growth. As the baby's mind develops and he is able to grasp objects, sit up, walk, talk, etc., we see him change from a passive, dependent chap to a more independent, active individual. This behavior is motivated by curiosity which is one of the most important characteristics of the mind. It is the basis for all learning and makes it possible for a child to slowly adapt himself to his environment. This curiosity is first of all about himself and then the world about him. It gives rise to play which is probably more important, from an educational standpoint. As the young child rapidly loses his complete dependence and becomes an aggressive youngster interested in play, his reactions make up what has been called the "almighty" stage of emotional growth. This period continues until the physiological changes incident to puberty manifest themselves. During this time, boys and girls are interested in themselves — their own problems, exploration, adventure and play. At this time they are not interested in such abstract norms as justice, honesty, truthfulness, personal appearance and consideration for others — the concepts which are so important to adults. They have neither developed sufficient intelligence to understand nor reached the level of emotional growth to appreciate these adult standards of behavior. Let me pause to assure you they will accept those norms of things when they are old enough, especially if they are left alone. There is not sufficient time to describe the details of emotional growth.

Infants are born with potentialities for physical, intellectual and emotional growth and develop according to general patterns which cannot be changed. In spite of this fact, which has been known and accepted for centuries, adults proceed to try and change or radically alter all of the normal emotional reactions of children from the time they are born. Let's see if that is true. Even though a baby has been a part of mother for nine months, the first thing we do at birth is to completely remove the infant from her. The baby has been fed continuously for nine months, but at birth he must eat every four hours (usually). He must eat a certain number of minutes and if he dares suck beyond that period, he is placed in a straight jacket. The amount of food he should eat is commonly determined in an arbitrary manner. His bowels must move at 8:30 A. M. and if they do not move at that time there is great distress in the home. We often see young mothers, often under medical guidance, spending one-fourth of their time forcing food into one end of the gastro-intestinal tract and painfully washing it out of the other. This program of infant care is carried out without any consideration for the emotional reactions of the baby, and in spite of the fact that habits of emotional response are forming from birth.

By the time a child reaches three years of age, he is convinced that all of his normal emotions are wrong or bad. Let's see if that is true. Suppose a three-year-old shows that impulse of independence (liberty), which is one of the strongest impulses back of human behavior, to the point of talking back. He is called impudent. "No child can talk back to me." Why shouldn't children talk back? What is a child told who says he is scared? Most commonly he is laughed at. "Shame on you; you should never be scared." Yet fear is one of the important primary emotions — instinctive in character and physiological in nature. Adults are scared every day, especially if they are driving automobiles. Next, what happens if the boy or girl shows that other normal emotion that distresses the human mind so much, namely, hate, and says he hates his brother (as all normal children do, at times). He receives a more severe admonition: "You must love your little brother." (I will not say what the boy or girl thinks or feels then). Appetite which is the physiological component of hunger has probably been ruined a long time before the age of three is reached. Finally, let us suppose this little boy or girl does or says something which is associated in the mind of the parent with that "terrible" subject, sex. The child is scared into believing that is bad and something he must never think about. In a similar manner, children are convinced they are bad before they are five years of age. Also many children are convinced they are dumb and an unbelievable percentage are made to feel they are not liked by that time. These are some of the reasons for the generally accepted statement that the conditions which give rise to psychological maladjustments ("nervousness") in adults have their origin during the first three

to five years of life.

If the above observations are true, the logical question is: What is important in the rearing of children? I think we have gone a long way in answering that question. There are three essentials for normal or optimum mental growth: security, confidence and an opportunity to develop self-reliance.

Security is the feeling which is given a child from birth by parents who are entirely satisfied with their offspring. The child has security who is accepted as he is; no alterations being necessary. It has been described as a feeling of "all rightness" on the part of the baby. In older children it may be described in this way; no matter what my child does, he can come to us (his parents) and discuss it without the slightest fear of criticism, humiliation or betrayal of confidence. In addition, he is assured that he will receive any aid his parents can give, if necessary, to help him out of any difficult situation that may arise. As the child enters school, he should have security in that school and his teachers. As he grows up, he should find security in his community and nation. Finally, as an adult, he should have security in his own ability to meet new and difficult situations in life and make a satisfactory adjustment to them.

In an analogous manner, a child should have confidence. Confidence in whom? First of all, in his parents. Parents normally think their children are superior to all others and should convince them of that fact. Later, confidence should be found in the school, community, church, nation and eventually in the individual's own ability.

Habits begin to develop at birth. As stated above, the baby responds to all situations in terms of feeling and action. The way he responds determines the kind of habits that are formed. The first habits that are formed have to do with eating, sleeping and eliminatioin. In fact, there is a sleep schedule already present at birth. The baby sleeps a few hours, then awakens and cries. He wants food for hunger and, in addition, sucks for emotional gratification. His nutritional and emotional needs having been satisfied, he goes back to sleep. This cycle of sleeping and waking forms the logical basis for the feeding schedule. It is usually 3, 3½, or 4 hour intervals. The baby develops food habits, then, according to his individual needs, both physical and mental.

How do children develop the third essential to normal emotional growth — self-relience? By self-reliance we mean the ability of an individual to meet situations — especially new and difficult ones — and make a successful adjustment to them. Since all behavior is in terms of habit, our problem is one of habit formation. The habits formed during infancy are most important and have a great deal of influence upon the kind of a personality the baby will have when he grows up.

More security is given a baby from breast feeding than in any other way; both physical and mental growth are stimulated more by it than by any other food or method of feeding. The infant can be allowed to take as much food as he likes. (If he is artificially fed it is assumed that it is of the proper proportions.) He can suck as long as he likes; there is no danger of harm from thumb-sucking during the first 3 to 5 years of life. The habit disappears before 18 months of age if the baby receives adequate security and attention.

How much fondling should a baby receive? The answer is: as much as the individual infant needs. He should be held and fondled at the feeding period (a comfortable rocking chair for the mother is desirable) until signs of fatigue appear. He should then be placed in his bed and left alone. A baby should not be used as an emotional outlet for parents, relatives and friends.

Babies quickly learn to take liquid from a bottle and solid food from a teaspoon if these foodstuffs are given early in life — before 4 months of age. By the time they are six months of age, babies like to put things in their mouths. This is the best time to begin offering the child milk from a cup. If it is given every day and the infant is allowed to take as much as he likes, he will often voluntarily wean himself from the bottle at about one year of age; he will voluntarily give up sucking in favor of the mature habit of eating all his food from a cup or a teaspoon. If he desires to take the bottle for a longer period, there is no objection to it.

The development of toilet habits can begin at about nine months of age. The baby may be placed on a comfortable toilet at the time he usually has a bowel movement. The best toilet is one that rests on the floor, so built that the child can rest his feet on the floor or on a sup-

port. He cannot be expected to make an effort if he is scared by placing him on an insecure toilet with his legs outstretched. Mothers should not try too hard to develop toilet habits in their children; babies will acquire the habit more quickly if force is not used.

Parents should be warned against the giving of enemas which are seldom necessary and often harmful, psychologically. Abnormal emotional disturbances commonly result from too much stimulation of the rectal region with painful enemas. The baby who is receiving the proper kind of food will not be constipated. Failure to have bowel movements every day is not the cause of illness, as formerly thought. It does not make any difference whether a baby has a bowel movement every day or every two or three days. Daily bowel movements are good habits for older children. In the case of older children, however, these habits can be developed by voluntary effort. Children develop them when they want to.

Children will take full responsibility for their food habits by the time they are 15 months of age. It is only necessary to offer them three meals per day, allow them to feed themselves and eat as much and as long as they like. Every child will eat a sufficient amount of food for health and gain if given the proper kind of food and left entirely alone.

A child can dress himself at two years of age. He cannot be expected to tie a bow knot or put on very complicated clothing in a manner that will always meet the approval of mother.

Children will usually take full responsibility for their toilet habits when they are about 2½ years of age. Boys and girls will stop wetting their beds as soon as they want to. They succeed as soon as they wish to please their parents and make an effort to do so. Restriction of fluids and getting children up at night do little good. The best results are obtained when the child is reminded occasionally that he does not have to wet the bed any more, given praise for any success, and ignoring his failures.

During the third year children begin to desire playmates. They should be allowed this young companionship for the discipline as well as the pleasure it affords. In this way they develop the habit of getting along with one another. In play they develop habits of caution and learn to do things for themselves.

There is not time to continue this important discussion of the ways and means of helping children develop habits for self-reliance. We have, however, covered the most important period and indicated the general principles to be followed. Give a child security, confidence and allow him to develop habits of self-reliance and he has the best chance of normal mental growth and success in life.

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THE ORTHOPAEDIC TREATMENT OF INFANTILE PARALYSIS

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This is the fourth article of a series

Orthopaedic treatment should be started as soon as the diagnosis of infantile paralysis is proved or strongly suspected. In addition to the family doctor or internist, an orthopaedic surgeon should be summoned immediately. The success of the immediate orthopaedic treatment depends upon meticulous care and unrelenting observation. Time is the essence of success in treatment.

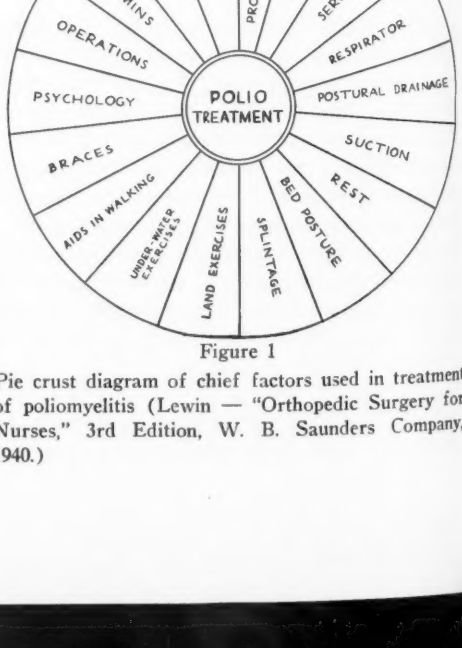

Figure 1

Pie crust diagram of chief factors used in treatment of poliomyelitis (Lewin — "Orthopedic Surgery for Nurses," 3rd Edition, W. B. Saunders Company, 1940.)

Rest — Rest is the one great essential in the immediate care. This must not only be complete and absolute, but must be managed so that the muscles placed at rest will be kept in a position of neutral pull. This is the most important factor in the prevention of later deformities and in minimizing residual disabilities. Complete rest is of such great importance during the early days of inflammation of the component parts of the central nervous system, that it is usually far better to keep the child in bed at home, when the disease is first suspected, than it is to move him any appreciable distance to a hospital, especially if the trip may be rough. The fatigue and agitation which may result are harmful, especially in "bulbar" cases.

Deformity is largely preventable. In order to achieve this end, muscles must be protected from stretching and fatigue. A muscle placed at rest in a position of relaxation, with its attachments approximated will recover sooner and more completely than will another muscle placed under tension.

Under no circumstances are massage, exercises or electrical stimulation to be used during the early acute stage. Not until the acute period is over should massage, induced heat, and the various forms of muscle training be started. In general, the accepted dividing line between the acute and convalescent stages is the cessation of muscle and skin tenderness.

Application of External Heat. — Extremities should be kept warm at all times. If necessary bed socks or stockings should be worn. Applied heat will relieve muscle and skin tenderness. Heat will cause muscle pain to disappear more readily, and shorten the duration of the acute period.

In the acute stage Miss Kenny employs hot applications. Woolen strips saturated with boiling water are "fished out" with a pole and run through a wringer, twice. These are applied from one joint to another, but not over the joint, in order to permit passive and active movements. These dressings are protected with oiled silk and more dry warm wool. They are changed every half hour during the first twenty-four or forty-eight hours. This is continued twenty-four hours a day. After the extremely sensitive period has passed, the procedure is carried out from 8 A.M. to 8 P.M. and then only every two hours. The fomentations gradually cool.

Small rolls of towel material are placed under the knees. Gentle passive exercises are given, but never to the point of pain. These are carried out during the first two days of the sensitive stage. The patient's activities are directed and concentrated in the area of the tendon where movement is to be expected.

After two passive movements, one active movement is attempted.

Miss Kenny's theory of the situation in acute polio is based upon:

I. "Muscle Spasm"
II. "Incoordination"
    Due to pain.
    Due to substitution of muscle function.
III. "Mental Alienation"
    The patient forgets to perform normal muscle function.
    The patient loses the idea of making muscles contract.

Her procedure in correcting the situation includes:

I. No splints of any kind except a foot board and the splinting that is inherent in the fomentations.
II. Hot fomentations.
    Very hot — to relax spasm — at intervals of from one-half hour to two hours from 8 A.M. to 8 P.M.
III. Special muscle re-education.
    Concentration on insertions of muscles.
IV. Avoidance of fatigue.
V. Maintenance of proper positions.
VI. Complete joint motion (possible because of less pain and no contractures).

Excellent results are claimed for this method. The most important practical benefits derived from this treatment are: rapid relief from pain and the prevention of contractures.

Primary Splinting: Any recognized type of splint which will maintain the correct neutral position can be used. In early poliomyelitis it is imperative to individualize the patients and to apply the measures appropriate to each case. This, however, may be limited to a certain extent by the type of equipment at hand.

THE PURPOSES OF SPLINTING are:

1. To balance muscles and thereby retain neutrality of muscle pull.
2. To protect weakened muscles.
3. To support limbs or other parts of the body.

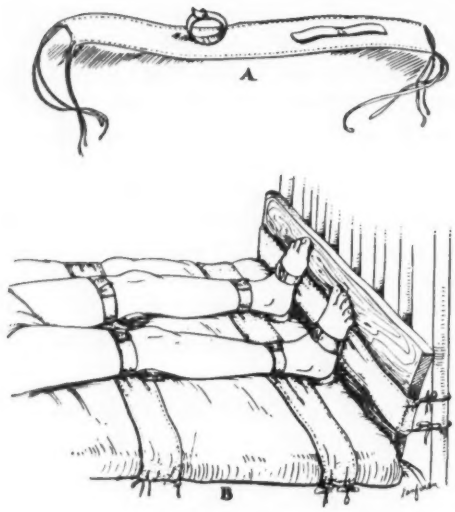

Figure 2

Michael Reese Fabric Restraint-Splint (Reproduced, Courtesy "Journal of American Medical Association")

A. Showing bandage-splint made of heavy cloth with two short strips of cloth attached. One strip made into loop and secured with safety pin. Note ties at ends of cloth.

B. Three restraint and bandage splints in position. Note rolls under knees and cotton "doughnuts" under heels. Pads for the soles of the feet are not shown.

The combination of this bandage and Carrell's Bradford frame with hinged restraint is excellent.

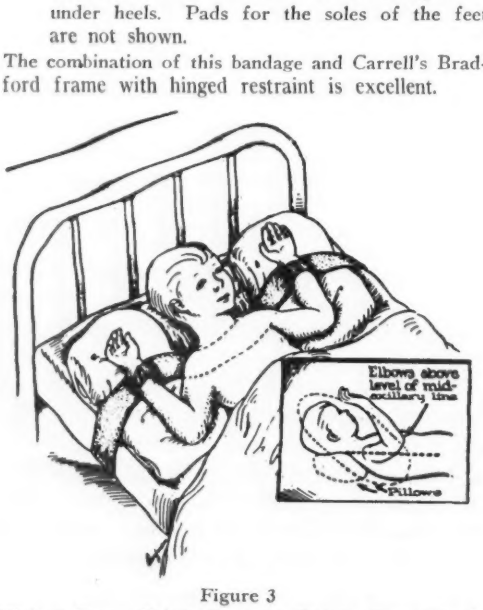

Figure 3

Michael Reese Fabric Restraint-Splint (Reproduced, Courtesy "Journal of American Medical Association")

Splint applied to the upper extremities maintaining the physiological position of neutral muscle pull. Note the pillows, the bandage and wristlets. The insert to the right below indicates the relationship of the arm to the patient's body.

Positions Favoring Optimum Return Of Muscle Power. — There are certain definite positions that are most desirable for the future usefulness of the limbs and trunk, a few of which are given here.

Fingers and Thumbs. — The proper position is that assumed in holding a drinking glass. The opponens pollicis and abductor brevis pollicis muscles abduct the thumb at right angle from the palm and hold it in the position of opposition to the little finger. Without the use of these muscles, it is difficult to pick up a glass of water, to hold a pencil, or to sew.

Wrist. — The wrist should be placed in slight hyperextension (doriflexion).

Forearm. — The positions of supination and pronation of the forearm are varied in accordance with the muscle weakness. The neutral position which protects both pronators and supinators is midway between pronation and supination.

Elbow. — The elbow should be flexed to a right angle. If the triceps is weak, it should be favored by keeping the elbow extended beyond a right angle. (This muscle is important in the use of crutches.)

Moving and Turning the Patient. — During the first few weeks, it is advisable to move the patient as little as possible. It is important, however, to prevent bedsores. The mother should be taught how to turn the patient on his side for short periods in order to relieve pressure on the back.

If the patient is on a straight Bradford frame, he may be turned on his face, with his feet hanging over the edge of the frame, provided the frame is elevated on blocks of wood which are high enough to prevent pressure of the toes on the bed.

The relation of the bed and bedside-table should be changed so that the patient will not repeatedly bend his trunk to the same side. Constant turning toward the same side may contribute to torticollis or scoliosis (if there is weakness of neck, abdominal or back muscles). Repeated reaching to the same side to turn the dial of a radio may cause imbalance of the trunk muscles.

The child on a frame may be carried to any room in the house. He may rest on top of the kitchen table, on a bench in front of the window

or on the porch. He may even be taken out of doors on top of a coaster wagon. The head of the frame may be tilted at an angle, allowing the child to look about more easily, provided it is always in a safe position. An opening in the canvas, in the region of the buttocks, makes it possible for the patient to use the bedpan without disturbing his position.

Turning the Patient. — In turning the poliomyelitic patient, twisting or torsion must be avoided. He should be handled as though he were a rigid object, like a poker which cannot be bent. The pelvic and shoulder girdles must turn as one unit. The nurses or attendants must not "wring" the patient as though he were a towel. A little traction and turning at the same time is often gratifying to the patient. The Stryker turning frame is very useful. The patient should be turned occasionally to prevent the formation of kidney stones.

Nursing Care. — The patient must be kept in bed, with physical and mental quiet. To preserve rigidity and prevent sagging, several boards or a wood frame may be placed under one or two mattresses. An "illuminated" cradle should be used to keep the coverings off the feet and the limbs warm. The room should not be brightly lighted. The patient should be handled with extreme gentleness, since the limbs are often excessively tender and sensitive to movement. A many-handled canvas litter may

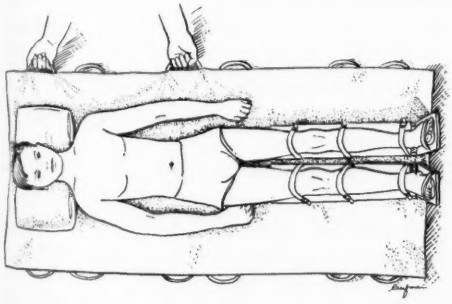

Figure 4

Canvas sheet with numerous handles to assist in lifting the patient from the bed to the cart, to the tub and back to bed.

be placed under the mattress to assist in transportation. Ice-bags applied to the back of the neck and to the spine sometimes relieve restlessness and pain. Sponging of the body should be done gently. The diet should be bland. The bowels must be kept open, but not with cathartics. Catheterization may be necessary.

Care of Patient Immediately After the Febrile Stage. — After first aid measures such as splinting and heat have been applied, and other supportive measures and specific treatment have been instituted, the temperature will usually revert to normal, i.e. within a week or ten days. At this time other measures can be instituted to alleviate residual muscle tenderness, and one can continue with the further treatment.

Treatment by Warm Sea Salt Baths. — Warm sea salt baths alleviate muscle and nerve pain. In some instances, they may be started very cautiously within seven days after the onset of the disease.

Completion of Physical Examination. — It is often necessary for the physician to wait until most of the muscle tenderness has subsided before he can complete the physical examination and determine the extent of muscle involvement. Thus a more accurate picture of the future outcome can be obtained. Because absolute rest is so imperative in the very early stages, it is much better to postpone a complete muscle examination until soreness has largely disappeared. Irreparable harm can be done by the energetic use of active physical therapy measures too early, in an attempt to prevent paralysis. The prevention of further paralysis lies mainly in the early maintenance of neutral muscle positions. Only after a complete picture of the seriousness of the muscle involvement is obtained can one decide what further therapeutic measures should be employed.

Physical Therapy After the Acute Stage. — The present trend is toward less exercise, less activity, less massage, and less active treatment of all kinds. More attention is being directed to the prevention of deformities by means of rest in proper positions, with constant supervision of the most minute details.

The less patients are handled in the early stages, the better are the results. Usually the early treatment-sessions do not last over ten minutes and no more than three counts of an exercise are given to any individual muscle.

The majority of the patients are kept off their feet from ten to twelve months before they are allowed to attempt to stand or walk even with the support of braces and crutches. If, however, a patient is very slightly affected, his ac-

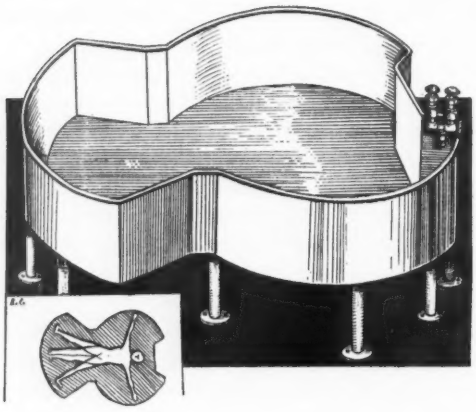

Figure 5
Lewin modification of Hubbard tub for under-water exercises.

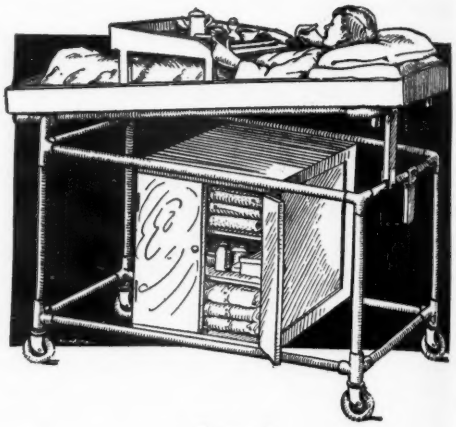

Figure 6
Wagon-cart for home care of poliomyelitis (McAloon).

tivities will depend largely on the return of power to the muscles of his trunk, pelvis and lower extremities. He would probably be kept off his feet at least six months.

Muscle Training. — Following an accurate muscle diagnosis and as soon as all soreness of the limbs has disappeared, active muscle training is begun with exercises, for five or ten minutes once a day. The aim is to prevent atrophy of the muscles through disuse and to aid in restoring the function of these muscles by training unaffected nerves to carry on the work of the affected ones, so far as possible.

Overuse of an affected limb is worse than disuse. Early sitting and standing, and constant efforts to move the muscles, urged by some cultists and unrecognized practitioners of physical therapy, are dangerous. There are no magical short cuts to recovery.

Assisted Movements. — Muscle training consists in aiding the patient to perform a certain movement, in the hope of stimulating an impulse for the movement from the brain to the weakened or paralyzed muscle. The patient is told to send a voluntary impulse to contract a muscle, and the limb is placed in such a position that gravity will impel performance, or else the movement is assisted by hand. "A movement a day keeps adhesions away." In the first year following paralysis involving one or both legs, the best results follow non-weight-bearing exercises combined with little, if any, walking. In selected cases, however, the upright position with protected weight bearing and restricted walking have certain advantages over protracted inactivity.

Underwater treatment has been an important advance in handling poliomyelitis patients. Lowman allows the patient to begin underwater movements as early as the twenty-first day, and to walk in deep water at the end of four or five weeks. The patient is submerged up to his neck. This improves his morale by eliminating pain, fear and anxiety, and by giving him pleasure. It restores balance and instills courage. The general health, sleep, and appetite improve. Nervousness diminishes. The buoyancy of the water minimizes fatigue of the weakened muscles. Ability to swim is a most valuable asset. Swimming should be part of the school drill. It is a sport in which the crippled child can equal others. Unsupervised swimming may cause much harm.

The Principles Of Massage. — Light massage, if given by a person especially trained in the after-care of infantile paralysis, is valuable. Plastridge offers the following rules:

(1) Never cause pain.

(2) Make the patient comfortable by the use of pillows or rolls to furnish support in order that the muscles may be relaxed.

(3) Use talcum powder* to make the strokes smooth.

(4) Use gentle but firm slow steady pressure in all strokes.

(5) In the extremities, make all strokes toward the heart.

*I prefer a skin oil.

(6) Be sure that there are no constricting bands, such as garters, or rolled-up sleeves, about the part being worked on.

(7) Treat each muscle group separately.

(8) Do not cause fatigue. Massage that is too heavy or too long is as tiring as too much exercise. From 5 to 10 minutes is sufficient for each limb. Good massage never wearies a patient. Massage improves the circulation and the tone of muscles.

Braces. — A brace is a mechanical support whose purpose is to maintain a certain position of a portion of the body. A splint, strictly speaking, is a type of brace. Splints are used early in the acute phase of the disease to maintain neutral muscle position, to prevent later deformity and to diminish pain. Braces, on the other hand, are used during the chronic or residual phase to supplement a deficiency in function caused by weakness or paralysis of muscles, and to prevent further deformity by furnishing adequate support and protection. Braces may also be used to correct deformity in selected cases.

Braces perform their greatest service either during the interval between the stage of maximum paralysis and such time as corrective operation can be performed, or after manipulation or orthopaedic surgery has accomplished its final degree of correction.

The minimal requirements of an efficient brace are: (1) to furnish the highest degree of stability commensurate with the physical state of the patient, (2) to protect against imbalance caused by unequal pull of normal muscles against paralytic muscles, (3) to prevent further deformity caused by this imbalance, (4) to be of light enough construction to permit the patient to use it without undue fatigue, (5) to avoid pressure areas on the skin or bony prominences, and (6) to be within the financial reach of the patient or of an agency that will furnish it, without sacrificing durability.

Indications for Surgical Treatment. — The purposes of operation are to: improve muscle function, improve static stability, correct deformities, and make it possible for the patient to discard braces. In general, operations on poliomyelitis patients include osteotomies, arthrodeses, fusions, resections of bone, plastic operations and tendon plastics and transplantations.

One should try to avoid major operations before the age of ten or twelve years. As a rule, no extensive operations should be performed within a year after the acute attack.

Operations on soft tissues include tendon-release, tendon lengthening, tendon transplantation, tenodesis, muscle-release and transplantation, silk ligament suspension and fascial-release and transplantation.

Operations on bones include osteotomy, tendon fixation, arthrodesis, arrest of epiphyseal growth, bone lengthening and bone shortening.

REMARKS

The six most important considerations concerning poliomyelitis are: first, a reliable test for the early diagnosis, i.e., before paralysis occurs; second, the isolation, identification and complete information concerning the virus; third, a protective vaccine serum or other material; fourth, serum or other substances that can be given before paralysis has occurred; fifth, maintenance of joints in positions of neutral muscle pull; sixth, the application of external heat.

One may reasonably hope that, by improved knowledge, the diagnosis will be made in the pre-paralytic stage, and in future epidemics, lives will be saved, deformities will be prevented and disability will be minimized.

PATHOGENESIS OF SUB-ACUTE BACTERIAL ENDOCARDITIS*

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Like tuberculosis of the meninges, bacterial endocarditis is a disease which is secondary to an area of infection elsewhere in the body; unlike the story of tuberculosis the conception of the PRIMARY infection in sub-acute bacterial endocarditis has remained vague. One of several micro-organisms occasionally causes infection of the endocardium but there is no disagreement as to the infectious agent of the disease which we know as "Sub-acute bacterial endocarditis" and which the Europeans so aptly call "sepsis lenta." Streptococcus viridans has long been recognized as the immediate cause of this disease but very little study has been made of the mechanism by which this organism reaches the heart. Our teaching has stopped with the enumeration of the

*From the laboratory of Rockford Hospital.
Read before Section on Medicine, Ill. State Medical Society, May 22, 1941, Chicago.

usual sites of focalization of the causative organism or with the statement that this form of cardiac disease is secondary to "a primary focus elsewhere in the body."

In consideration of the pathogensis of bacterial endocarditis we can profitably review some of the well established principles of the infectious diseases. Only a very few known organisms — notably Pasteurella pestis and Bacterium tularense — are capable of entering the body through the intact skin or mucous membranes, and even they produce a local, though sometimes unrecognized, lesion at the portal of entry. All infections, of organs which are not connected directly with the body surfaces are secondary to infections at the portal of entry, — that is, the portal of entry is an area of infection itself. In those conditions such as syphilis and tularemia in which the pathogenesis is well understood, we speak of the portal of entry as the initial lesion; in other conditions we call it a focus of infection.

THE CAUSATIVE ORGANISM

Most of the green-producing streptococci are harmless saprophytes,[1] but the group which is known as S. viridans is capable of causing subacute and chronic infections. Streptococcus viridans is not an invasive organism. Streptococcus viridans lacks almost entirely in invasive ability and even when it is forced into the blood stream, it is only able to establish itself on vulnerable areas in the vascular system, such as the scarred heart valves of healed rheumatic fever, congenital heart lesions or areas damaged from other causes. The natural habitat of the green-producing streptococci is the oral and pharyngeal cavities. Some of the normal flora of this habitat naturally pass on into the intestinal tract but no other part of the body is seeded so heavily and constantly as the mouth and the throat. S. viridans prefers to live in a moderately reduced oxygen tension; therefore it is found in luxuriant growth in the crypts of the tonsils, pyorrheal sacs and other natural and artificial pockets which are not well aerated. The gum margins are heavily seeded and this organism eventually reaches the apex of almost all diseased teeth. The route to the apical tissue may be through cavitation of the enamel and dentine, thence through the pulp tissue, or it may be via pyorrheal infection — i.e. separation of the peridental membrane, strangulation of the pulp and direct extension from the depth of the pyorrheal pocket.[2] Many competent bacteriologic surveys have established the regular presence of S. viridans in the apical tissue of diseased teeth, both deciduous and permanent.[3, 4, 5] It is present whether or not granuloma or abscess can be demonstrated by X-ray or other means. Such infected alveoli are potential portals of entry into the general circulation.

THE RELATION OF TRAUMA TO INFECTED ALVEOLI

Traumatism of these foci causes the entrance of bacteria into the blood stream in a percentage of cases dependent largely upon the severity of the alveolar disease and the degree of the trauma. Richards[6] produced bacteremia by massage of infected gums in 3 to 17 cases. Okell and Elliott,[7] and Palmer and Kempf[8] have demonstrated bacteremia following dental operations. In 1935 Okell and Elliott reported the first comprehensive study of this problem. In 75% of patients with severe alveolar infection undergoing multiple extractions they reported the presence of bacteremia as determined by the culture taken immediately after the operation. Palmer and Kempf studied a group of 82 cases who had one or not more than two teeth extracted and reported 17% of the blood cultures taken immediately after the operation positive with S. viridans present in all but one of the cultures. The great majority of organisms which gain entrance in this manner survive only momentarily. The circulation is very rapidly cleared of the invader, presumably by the reticulo-endothelial system so that it is only blood cultures taken very soon following massage or dental trauma which yield positive results. In cultures taken ten minutes later no growth takes place. These findings are evidence of the low virulence of S. viridans and also suggest that this germ may be dispersed from the foci in the jaw into the blood stream purely by mechanical forces. If bacterial invasion played much part one would expect the bacteremia to be maintained at least for short periods. Okell and Elliott also reported that 10.9% of individuals with very severe oral sepsis had blood cultures which contained Streptococcus viridans before any surgery was done. This has been spoken of as a "physiological leak" of organisms into the blood stream; but however descriptive, this is a bad term. The condition is

not physiological because it is dependent upon diseased gum tissue. Organisms which gain entrance to the blood stream through such a leak are constantly being removed and if there is no vulnerable spot in the vascular system no secondary infection occurs. Since it is known that dispersion into the blood stream occurs in proportion to the severity of the infection and the extent of the trauma, one is permitted to wonder if the amount of trauma incident to chewing is not sufficient to disperse organisms from these very badly diseased jaws.

THE DISTANT INFECTION

During the seconds or minutes which S. viridans circulates following dispersion from the primary focus, it may lodge on a scarred valve in the rheumatic patient or upon an area of congenital defect in another patient and the chills and sepsis which follow heralds the onset of the disease "Sub-acute bacterial endocarditis." In 1939 Palmer and Kempf reported 4 cases of this disease in which the onset was immediately incident to dental manipulation. Autopsy studies were included.

Two of these cases which were previously reported in detail are briefly abstracted here: 1. A white business man, 44 years of age with known congenital heart disease since early childhood had a large number of teeth extracted at one sitting. Except for limitation of physical activity he was well to this time. His teeth were removed because of iritis. Sepsis dated immediately from the dental operation and ended fatally after a one year course. Blood cultures were repeatedly positive for Streptococcus viridans. Patent ductus arteriosus with engrafted bacterial endocarditis of the pulmonary valve, mycotic aneurysm of the intra-cardiac portion of the pulmonary artery, acute fibrinous pericarditis and multiple aneurysms of the pulmonary arteries were found. 2. A white woman 35 years old with mitral stenosis of rheumatic origin was under treatment for oral sepsis. She had gone to the dentist feeling well. Procaine hydrochloride was injected into the gums during the course of the treatment. She returned home, experienced a chill and a very septic course followed. S. viridans was present in the blood cultures. Emaciation, anemia and embolic phenomena resulted and she died after a course of six months duration. The autopsy revealed typical vegetative lesions engrafted upon a scarred and stenotic mitral valve.

Secondary localization of Streptococcus viridans may occur in parts of the vascular system other than the heart. The typical picture of sepsis lenta (without the physical findings of endocarditis) has been reported[9] in a case who presented at autopsy vegetative lesions engrafted upon an area of atheromatous damage in the abdominal aorta. The author has seen the same type of localization in a cerebral artery in a fatal case which followed tooth extraction.

The editors of the Year Book of General Medicine have suggested that "The administration of sulfapyridine for 48 hrs. before and after each dental treatment or extraction seems worthy of trial." This would seem to be excellent practice in any case of vascular disease who must undergo dental manipulation. One would not expect the drug to prevent the mechanical dispersion — and we have some evidence in another group of bacteriological studies to be reported later, that this is true — but it is reasonable to believe that the danger of implantation of the circulating organisms on the heart valves might be lessened. It is erroneous to reason that the drug would not be effective in prevention of localization because it has not been effective in treatment of endocarditis. In treating the disease, one has to deal with S. viridans colonies well protected by a thick fibrinous vegetation and fibrin has been shown to be a very effective barrier to all of the sulfonamide drugs.[10]

BIBLIOGRAPHY

1. Zinsser & Bayne-Jones: Textbook of Bacteriology, 7th ed., Appleton Century.

2. Miller, I. S.: Dental Infection and Systemic Disease, Dent. Digest 36: 145-154 (March) 1930.

3. Haden, R. L.: Experimental Evidence of Relation of Dental Infection to Systemic Disease, J. Kansas M. Soc. 26: 41-47 (Feb.) 1926.

4. Rosenow, E. C.: Oral Sepsis in Its Relationship to Focal Infection and Elective Localization, J. Am. Dent. A. 14: 1417-1438 (Aug.) 1927.

5. Henry, G. W., and Doyle, Mary C. H.: Focal Infection in Teeth, Am. J. Psychiat. 8: 5 (March) 1929. Haden.[1]

6. Richards, J. H.: Bacteremia Following Irritation of Foci of Infection, J.A.M.A. 99: 1496 (Oct. 29) 1932.

7. Okell, C. C., and Elliott, S. D.: Bacteremia and Oral Sepsis, with Special Reference to Etiology of Subacute Bacterial Endocarditis, Lancet 2: 869 (Oct. 19) 1935.

8. Palmer, H. D. & Kempf, Myrna: Streptococcus Viridans Bacteremia Following Extraction of Teeth, J.A.M.A. 113: 1788 (Nov. 11) 1939.

9. Reported at Meeting of Chicago Heart Ass'n, 1940.

10. Duncan, Chas. N. and Faulkner, James M., Penetration of Blood Clot by Sulfanilamide, Sulfapyridine, Sulfathiazole and Sulfamethylthiazole, Am. J. Med. So. 200: 492 (October) 1940.

BILATERAL OOPHORECTOMY IN EARLY PREGNANCY

Report of A Case

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A thirty one year old farmer's wife was seen one night with all the symptoms and physical findings of an acute abdomen. Her previous history was negative except that four years previously she had delivered a seven months macerated foetus the cause of which was not determined; the Kahn and Wasserman were negative. A year later she became pregnant again and went to full term and delivered a living male child.

A tentative diagnosis of ruptured ectopic pregnancy was made, an exploratory operation performed and a twisted ovarian cyst removed. Disease of the opposite ovary was present and it too was removed. The uterus was small and in view of the fact that her last menstrual period was then only two weeks overdue, pregnancy was questionable. Recovery from the operation was uneventful.

About one month later pregnancy was still questionable although she complained of nausea and vomiting. She was next seen about four and one-half months following her last menses; she had by this time noted quickening, the uterus was enlarged to four and one-half months and Hegars and Chadwicks signs were positive, but no definite foetal heart sounds were heard, although there was a loud funic souffle. Urine and blood pressure was negative. No tests were made on the urine for pregnancy at any time because of expense.

Pregnancy continued uneventfully. A few days before the expected confinement date, she reported marked itching and burning about the vulva. Examination showed a very acute vaginitis and vulvitis which proved to be a yeast infection. This gradually subsided under treatment.

Parturition took place about eleven days after the expected confinement date. She delivered a normal female child spontaneously. The placenta was grossly normal. Lactation was very slight but this was true with the first baby.

About a year later, February 1941, this patient was again seen: she had been amenorrheic to date. The uterus was normal as to size shape and resistance and there was no apparent atrophy.

In this case both ovaries were removed March 23, 1940; and her last period had been February 6th. This shows that pregnancy could not have been present more than about thirty-five days (adding ten days to February 6th as probably the earliest possible date of ovulation).

Recently, Seegar and Delfs[1] reported one case from the Johns Hopkins Hospital "from whom all ovarian tissue was removed on the sixty-third day of gestation." Pregnandiol determinations throughout the course of pregnancy in their case were unusually low, the cause of which "cannot at present be evaluated."

Stimulated by the report of their case, communication with Dr. Seegar lead to one pregnandiol determination and this during the last month of pregnancy. This proved to be 61.5 mgm in twenty-four hours, and to quote Dr. Seegar, "is well within the limits of normal and seems to prove conclusively that the placenta is producing the majority of the progesterone."

Conclusions: Some tissue beside the ovaries was responsible for progesterone production in this woman as early as the thirty-fifth day of gestation. This tissue may be placental but it may also be adrenal, since progesterone has been isolated from adrenal extracts.[2] The presence of pregnandiol in the urine has also been reported from two patients who had an adrenogenital syndrome neither of whom had corpora lutea.[3] Small amounts have also been isolated from male urine.

This is probably one of the earliest cases of its kind ever reported. An extensive review of the literature fails to reveal one earlier.[4, 5]

Further studies will probably bring forth more definite knowledge on this interesting subject.

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BIBLIOGRAPHY

1. Seegar, G. E.; Delfs E.: Pregnandiol Excretion Following Bilateral Oophorectomy in Early Pregnancy, J.A.M.A. 115: 1267 (Nov. 15) 1940.
2. Beall, D.; Reichstein, T.: Isolation of Progesterone and Allopregnanolone from Adrenal, Nature 142: 479 (Sept. 10) 1938.
3. Venning, Eleanor H.; Weil, P. G., and Browne, J. L. S.: Excretion of Sodium Pregnandiol Glucuronidate in the Adreno-Genital Syndrome, Proceedings of the 33rd Annual Meeting of the American Society of Biological Chemists, (April 26-29) 1939.
4. Stropeni, L.: Bilateral Ovariectomy in Pregnancy. Delivered at Term. Ann. di Ostet., 38: 493. (Dec. 31) 1916.
5. Grosse, A.: Bilateral Ovaritomy During the First Four Months of Pregnancy and the Action of the Corpus Luteum on the Evolution of the Fertilized Ovum. Rev. Franc de gynec. et d'obstet. 14: 424 (Nov.) 1919.

GENERAL MEDICINE IN A MENTAL HOSPITAL

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Of the one million beds available in the hospitals of this country, six hundred thousand are occupied by patients suffering from nervous and mental diseases. In the state of Illinois more than thirty thousand patients are daily cared for in the mental hospitals, and this is only a small part of the persons needing care for nervous or mental disorders. We know from the selective service examinations that a high percentage of the number of draftees have to be rejected from military service because of mental disorders. This is unfortunate but it is essential to keep psychopathic, psychoneurotic, feeble-minded, and psychotic persons out of the army.

It is therefore obvious that the problem of mental health in our population is an urgent one from a sociological, economic, as well as from a medical point of view. In spite of the fact that the number of patients seeking help for nervous and mental disorders is steadily growing, the physicians in general practice are often unfamiliar with the work and facilities of the mental hospitals provided by the state. To a large extent this is not the fault of the physician, but rather of the psychiatrists working in the institutions who have formerly isolated themselves from general medicine almost as much as they have isolated their patients from society.

The criticism of S. Weir Mitchel many years ago was that the asylum physicians lived apart from general medicine; and he accused them: "their hospitals are not our hospitals and their ways are not our ways." This is still true in a large number of hospitals. However, the physicians working in the institutions of Illinois have tried for years to bring about a closer relationship between psychiatry and general medicine. As an expression of this, it should be pointed out that during the last four years the Physicians' Association of the Department of Public Welfare has held its meeting in connection with the annual meeting of this society; the good attendance at the last meeting was an example of the interest these physicians are taking in this society.

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When I was invited to talk about the work being done at the Elgin State Hospital and to give a general impression of the progress being made by the state institution in medicine, I accepted gladly for two reasons. First, I'm convinced that by closer collaboration of the physicians in outside practice and the psychiatrists working in the state institutions, patients will benefit greatly. Secondly, it gives me the opportunity to express the thanks of the physicians working in the state hospitals to this society, which has assisted in every respect to improve the service in the state hospitals.

There has been a gradual change in the attitude of the state hospital physicians towards their patients. For a long time the chief emphasis was placed on the custodial care of the patients. Nowadays the state hospital, like any general hospital, is working upon the principle that the chief emphasis has to be placed on the rehabilitation and the improvement of the patients and the parole and discharge of as many of them as possible. That we not always succeed in improving our patients or in restoring them to their former health is unfortunate, but I believe this difficulty is common with the men in general medicine, with the surgeon, and all other branches of medicine. The increasing number of paroles, the rising number of discharges, the large number of voluntary admissions all show that the service rendered by the state institutions is improving and that the physicians and the laity have more confidence in their work now than they had many years ago.

The work in a mental hospital is as varied as in any general hospital. We have to deal with the chronic alcoholic as well as with the acute catatonic excitement; with the hysteric patients, as well as with cases of severe melancholia; with the senile and arteriosclerotic dementias and the patients suffering from general paresis; Besides these we have to deal with a large number of cases of manic-depressive psychosis and schizophrenia. Aside from this purely psychiatric work, general medicine plays a great role in the state institutions. As in any general hospital, we are dealing with cardiac diseases and tuberculosis, and we have to fight constantly against the outbreak of infectious diseases. The physical health of our patients is of extreme importance. Before we can even start treating

mental disorders, we have to be certain that the patient is in good physical condition. Very often the physical examination alone will reveal the cause of the psychotic behavior of the patient and how to remedy it.

A twenty-five-year-old girl, colored, was admitted because she had suddenly developed mental symptoms about two weeks prior to her commitment. One morning at four o'clock she complained that her mother had not treated her right, that she herself had led a sinful life; and she began to talk about religion and to preach in a loud, wild fashion. She became hyperactive, played all day and night. In the hospital the patient was irritable, talked constantly, and was disoriented for time and place. She exhibited rhythmic movements in a dance-like manner. The physical examination revealed a large hard tumor in the abdomen. She had a blood pressure of 160/120 and urine showed a 2x albumin. There were many coarse and fine hyaline casts. The blood chemistry revealed an N.P.N. of 116.4, Creatinine content of 3.97, and blood sugar was 91 mg.%. The patient was in very critical condition. Her temperature fluctuated between 101.6 and 103. Her respiration was quite rapid. The diagnosis made was toxic psychosis, caused by uremia, which in turn was due to a large tumor of the uterus, probably pressing on both ureters. She was immediately operated on and a large fibroid tumor of the uterus, pressing on both ureters, was removed. Following this operation, the patient improved rapidly and a week later her psychotic symptoms could not be demonstrated.

K. S., a fifty-three-year-old, white male, was found walking backwards on the streets of some town. He talked irrationally and it was said he made some indecent remarks to women. He was sent to Elgin. On admission to the hospital he was disoriented. Neurological examination showed evidence of an increased intracranial pressure. The reflex changes pointed to a lesion over the left hemisphere. The spinal fluid examination, the chemical constituents of the blood, and x-ray of the skull did not reveal any essential changes. However, the electroencephalogram showed marked disturbance over the left hemisphere, substantiating the neurological findings. There was a predominance of very slow waves over the left side of the brain and discharges of the grand mal type were frequent over the left hemisphere. The operation revealed a large encapsulated hematoma over the left frontal and parietal lobes. The hematoma was completely removed and patient made an uneventful recovery. He is working again in the same mine where he worked previous to commitment.

The electroencephalogram was helpful in the last case in establishing a definite diagnosis. The recording of the brain waves has proven to be of great value in a large variety of mental disorders, and in spite of the fact that it has been in use at Elgin for less than eighteen months, this instrument is a valuable aid in our diagnostic service, as well as in the field of investigative work.

A twenty-five-year-old secretary was out of work for two years because she complained of dizzy spells. She was treated by many physicians. Her home situation was difficult. She had an alcoholic father, who caused a great deal of discord in the home situation, and she had a fiancé to whom she had been engaged for seven years, and whom she was reluctant to marry. Her dizzy spells interfered with her daily work, so that she had to give up her job. Neurologically, no essential changes could be found, but the electroencephalogram (and only this) showed that the dizzy spells were in fact numerous petit mal attacks of an epileptic nature. The administration of luminal 3/4 gr. t.i.d. caused complete cessation of these spells, and a week after the administration of phenobarbital, the patient was able to resume her work, which she has carried out now, without interruption, for more than a year.

This case is an example of the usefulness of the electroencephalogram in the psychiatric diagnostic instrumentarium. The more modern our facilities and the more highly trained the physicians in the mental hospitals, the better will be the treatment of the patients.

Along with the daily routine, our physicians receive lectures in psychiatry, neurology, pathology, and we try to make each one of them a competent specialist in psychiatry. However, one cannot be a specialist in every field; the large number of patients confined in a mental hospital (in Elgin alone there are more than 5000 patients) present problems of a general medical nature daily, and we are grateful to the help we receive from the physicians in practice who devote a great deal of their time to our consulting service. Each case of tuberculosis is seen by a tuberculosis consultant, each case of heart disease by a cardiologist; every female patient is examined by a gynecologist, etc., all to insure adequate and good medical service.

Each patient in the institution has a complete physical checkup every six months, and I wish this also could be said for persons living outside of institutions.

It is often said that the interest of the physician in medicine is measured by his interest in investigative work which he does in addition to his routine duties. More than thirty papers have been published from the Elgin State Hospital during the last two years. This work is chiefly

concerned with problems in psychiatry. Pathological, biochemical, and psychological investigations are being carried on, insofar as they have connection with problems involved in the care and treatment of psychotic patients.

Nutritional defect states assume an ever-increasingly important role as causative factors of mental disorders. Delirium tremens, Korsakoff's psychosis, alcoholic polyneuritis respond very well to vitamin therapy. Alcohol is only indirectly responsible for these disorders. Biochemical investigations will doubtless help us in understanding many functional mental diseases; and they form an essential part in the study of schizophrenic behavior disorders.

The therapeutic nihilism which dominated psychiatry for a long time was interrupted by the introduction of the shock therapies. These therapeutic procedures, which are much more drastic than any treatment employed before, seemed to open the way for a specific treatment of the mental disorders heretofore only treated by general therapeutic procedures.

It was the first time in medical history that epileptiform convulsions and deep, long-lasting comatose states were used in the treatment of a disease. It was therefore essential to study the effect of these treatments not only from the standpoint of therapeutic results obtained, but also from the viewpoint of possible damage produced by these severe forms of therapy. Animal experiments showed that insulin shock therapy, metrazol convulsive therapy, and electric shock produced definite alterations in the brain. Comparatively the same alterations could be demonstrated in patients who had died several months after metrazol therapy had been discontinued. From our investigations we learned a great deal concerning the clinical handling of our patients and this has led us to a more careful and more sensible way of treatment. Constant revision and constant check of the work we are doing are essential for the advance of state hospital service. Investigative work forms an important part of the hospital duties, and the more it can be increased, the better will be the service rendered to the patients.

I have tried to give you a short outline of the work being done in the mental hospitals today. It is understood that only a few points could be stressed and we know there is much room for improvement.

One of the major problems which confronts us today is the problem of overcrowding. The number of admissions is constantly rising. In order to keep a balance in the number of hospital patients, it is essential to discharge and to parole more patients than was done heretofore, and to return some patients to their families under the care of the family physician even though they may not yet be entirely well. By close collaboration between the hospital and family physician, the patient will not be harmed by an early return to his home, but rather be benefited. His adjustment in the home situation will probably be greatly simplified; we are convinced that the patient, the family physician, as well as the hospital, will gain by this procedure.

I hope I have aroused some interest in the work being done in the mental hospitals of this state and that I have conveyed the impression that we constantly try to improve our therapeutic measures.

May I express my thanks to Dr. Norbury for having suggested this topic of discussion, and thank you for the honor and privilege of talking to you.

THE EYE PROBLEMS IN GRAVES' DISEASE

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That malady first described by the Englishman Parry in 1815, but generally called after the Irishman Graves, who gave a somewhat more complete description of it in 1835, is characterized by a combination of thyroid and ophthalmic manifestations. For this reason it has been descriptively called exophthalmic goiter.

Nearly always it is regarded, nowadays, as a disease primarily of thyroid origin, and nearly always the therapeutic attack is aimed at the thyroid gland, as being the chief offender.

It is my purpose, today, to suggest that this is perhaps not the most scientifically accurate conception of the disease, and further that an attack upon the thyroid gland is not in every instance the best form of treatment.

From the Thyroid Clinic of the Massachusetts General Hospital, Boston.

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As to pathogenesis, it certainly can be said that other endocrine glands than the thyroid are involved; for example the anterior pituitary, also the nervous and reticulo-endothelial systems.[1] The late Dr. A. S. Warthin[2] emphasized the constitutional and hereditary factors and coined the term "Graves' constitution."

Of course, the ultimate cause of the disease is unknown. Nevertheless sufficient evidence now exists to warrant defining it as a constitutional disturbance involving a complicated hormonic imbalance, having wide-spread effects, in which the thyroid is but one item.

In this imbalance the over-activity of the thyroid is the most familiar and best understood part of the process. The action of the thyroid hormone on general metabolism is well known. The measurement thereof, by determining basal oxygen absorption, is a common diagnostic procedure. The symptoms due directly to hyperthyroidism are easily recognizable.

Also familiar and equally characteristic of the disease, but far less well understood, is the peculiar ophthalmic involvement. It can be asserted on the basis of work, both experimental and clinical, that the eye condition is not a direct result of hyperthyroidism. Rather are they both to be looked upon as individual effects of a wide-spread and fundamental disturbance.

Furthermore, it can be said with considerable assurance that while the symptoms of hyperthyroidism are related to the calorigenic action of the thyroid hormone, the ophthalmic changes are related to changes in water balance which result from altered balance between hormones which produce water storage, such as the thyrotropic hormone of the pituitary, and those which promote discharge of water, such as the thyroid hormone. In considering then the morbid physiology of Graves' disease in toto and in attempting to derive a rational mode of treatment therefrom, it is quite as necessary to take into account the changes in water balance which lead to eye signs as the hypermetabolism which leads to tachycardia, weight loss, sweating and so forth.

Most surgeons and many physicians think that some form of thyroidectomy is the ideal form of treatment for Graves' disease. There is, moreover, no gainsaying that in the majority of cases the results of this procedure are surprisingly good. They are in fact better than, theoretically, they ought to be. It was shown years ago by Halsted[3] that ablation of a large portion of the thyroid was followed by regeneration in the fragment remaining. Of course, not a few patients regenerate thyroid tissue after subtotal thyroidectomy for Graves' disease. Some indeed regrow a goiter as large as the original one. But it is less remarkable that some do this than that many more do not. If the over-acting, hyperplastic thyroid gland is merely a result of the disease, rather than its cause, then a partial removal of it might be expected always to be followed by regeneration of tissue and recurrence of thyrotoxic symptoms. But such is only occasionally the case. In suggesting that thyroidectomy in Graves' disease does more than remove hyperfunctioning thyroid tissue, through quantitatively reducing the output of thyroid hormone, that in fact it serves to break up some sort of vicious hormonic circle, thus permitting the organism to re-establish a normal hormonic balance, Pemberton[4] has, I think, put us on the trail of a likely explanation for the apparent paradox. In any event, I submit that although the results of subtotal thyroidectomy in the properly iodinized patient with Graves' disease are often excellent, nevertheless, thyroidectomy in this disease is to be classified as symptomatic, not specific treatment. It assuredly is not the ideal treatment, nor do I believe it will be the ultimate treatment. When the nature of the hormonic imbalance, which is the disease, and the causes which bring it into being are identified, then a treatment, probably non-surgical, designed to restore hormonic balance to normal, may become possible.

For the moment, however, we must use the methods now available, and I freely concede that when the full and classic picture of exophthalmic goiter is present and when no special contraindications are present, subtotal thyroidectomy offers the best chance of prompt and permanent relief. It is to be noted, however, that such a therapeutic attack is designed to remove the state of hyperthyroidism or thyrotoxicosis, and thereby remove the symptoms directly resulting from that state. It is not aimed in any specific sense at the eye involvement. Nevertheless, it must further be admitted that in the average case such an attack suffices, and that no treatment aimed specifically at the eyes is required. If the thyrotoxicosis is removed the eyes improve also. No special treatment for them is necessary.

However, there are cases, and these are the occasion for the present communication, in which the situation is quite different, and in which the treatment, I believe, should be quite different.

In contrast to the classic case, in which thyrotoxicosis and eye involvement vary in parallel, there are cases in which the ophthalmopathy and thyrotoxicosis become dissociated and vary independently or in reverse. For example, the eye involvement may be very impressive or severe and the thyrotoxicosis very slight. The eyes may get worse, as the thyrotoxicosis gets better. There may be a progressive ophthalmopathy, perhaps after thyroidectomy, at a time when the patient's thyroid status is one of frank hypothyroidism.

My colleagues and I believe that such cases should be recognized and set apart as representing a definite subspecies of Graves' disease. For them we have been able to invent no better term than Graves' disease with dissociation of thyrotoxicosis and ophthalmopathy. The literature abounds with descriptions of them and various terms have been proposed, none of which seems to us broad enough to include all the cases we think ought to be included*. They probably constitute not over 4 to 5 per cent of the total cases of Graves' disease.

There seems to us little doubt that the ophthalmopathy in this subspecies of Graves' disease may be aggravated by thyroidectomy. Sometimes the cases come to us after thyroidectomy with a story that the eye signs were trivial till the goiter was removed and became progressively worse thereafter. Sometimes we have identified them before thyroidectomy and watched them get worse after. More recently we have identified them and refrained from operating and have convinced ourselves, at least, that we have spared them some opththalmic mischief by such management.

As to how cases falling in the subspecies may be recognized, we may say that the chief point is that from the beginning the accent is upon the eyes. Often these patients complain of nothing but their eyes. Often they consult first the ophthalmologist, who then refers them to the Thyroid Clinic. The eye symptoms complained of may be diplopia, tearing, smarting and irritation, swelling of the lids, and perhaps actual protrusion. On examination, edema, injection, chemosis of the conjunctiva, ophthalmoplegia, and epiphora are all more in evidence than the more classic signs of simple proptosis, lid retraction and so forth. The eyes usually look somewhat prominent, but the swollen and angry appearance is what chiefly attracts attention.

When such a picture is encountered, and when in addition thyrotoxic manifestations are minimal or absent, and the thyroid is either slightly or not identifiably enlarged, then, we believe, the classification should be that of Graves' disease with dissociation of thyrotoxicosis and ophthalmopathy; and furthermore the treatment should be designed to safeguard the eyes which constitute in these cases the major therapeutic problem.

A further point in recognition is that, as Hertz has shown, these patients tend to make a superstandard metabolic response to iodine. From a level of plus 15 to plus 20 they may fall to minus 20 or minus 25.

When the classification has been made preoperatively, we believe the therapeutic program should be as follows. Thyroidectomy is contraindicated. It is not necessary for thyrotoxicosis, because there is little if any thyrotoxicosis present. It not only will not benefit the eyes, it may actively harm them.

The role of iodine is somewhat problematical. We have seen such cases improve satisfactorily on prolonged iodine alone. This is difficult to understand for it lowers the metabolism, and lowered metabolism seems definitely inimical to the eyes.

In the production of the ophthalmopathy, it has already been indicated, edema of orbital tissues plays a major role. Thyroid hormone produces diuresis. Therefore thyroid hormone should be beneficial to the eyes, and indeed experience shows that it is. It has been our practice, following H. S. Plummer, to give these patients both iodine and thyroid. Holding the basal metabolic rate as low as possible with iodine, we then give as much thyroid as they can take without becoming thyrotoxic. The metabolic actions of the two agents cancel out, but it is not the metabolic we are after, but rather the diuretic action of the thyroid. Also thyroid

*For example, malignant exophthalmos, progressive exophthalmos following thyroidectomy, exophthalmic ophthalmoplegia, postoperative progressive exophthalmos with low basal metabolic rate.

may exert a beneficial action by inhibiting the action of the pituitary in the production of thyrotropic hormone which acts to increase water storage.

We would go on with this program for so long as the progress was satisfactory, or until it definitely proved inadequate. Very close supervision of the whole situation and particularly of the eyes, should be maintained. Vision, visual fields, exophthalmos, and state of corneae and conjunctivae should all be kept track of. If and when either vision or eyes are in any danger, such palliative procedures as orbital decompression should be promptly resorted to. If thyroidectomy is avoided and the type of management indicated above followed, we believe the necessity for decompression will be rather infrequent. The ophthalmic process is undoubtedly for a considerable time reversible. Later, however, it may go into an irreversible phase for which decompression is the only treatment. When, under these circumstances, decompression is not done soon enough, enucleation may eventually become necessary. The objective is so to manage the case that the development of the irreversible phase is prevented.

Another possibly useful procedure in certain cases is irradiation of the pituitary, on the theory that it is over-active and that its overactivity aggravates the ophthalmopathy. We have used it in but one case in which a definite hemianopsia, thought to be the result of pituitary swelling, was demonstrated. In this case the eyes showed a marked improvement, but whether a matter of cause and effect, or mere chance, we are not prepared to say.

In certain cases when there has been a sudden aggravation in orbital edema, we have observed temporary benefit from the use of diuretics, and in one case from lumbar puncture.

It goes without saying that local protective measures to the eyes should be used as indicated — grease to prevent drying, shields, lid suture and so forth, as advised by the ophthalmologist.

With regard to sympathectomy, which in the past has been advocated as a treatment for malignant exophthalmos, we may say very definitely that we have never seen any good come from it and we are strongly opposed to its use. The fact is that in human exophthalmos there is little, if any, evidence that the sympathetic system plays an important part; and that being true, there is no reason why sympathectomy should be beneficial.

Finally, it must be observed that the type of ophthalmopathy described may rarely occur in patients having also an important thyrotoxicosis, one which demands treatment per se. When this is the case, we believe that irradiation treatment of the thyroid is less likely to aggravate the eye condition than thyroidectomy, probably because its action is slower and thus permits more gradual hormonic readjustment. The recent work of Soley gives some proof in this connection[5].

SUMMARY

Attention is drawn to a subspecies of Graves' disease in which the eyes rather than the thyrotoxicosis constitute the major therapeutic problem. Theoretical considerations are touched upon, and methods of diagnosis and treatment are indicated. The points chiefly emphasized are that in this subspecies thyroidectomy is undesirable and thyroid administration, in some cases at least, beneficial.

BIBLIOGRAPHY

1. Hertz, S. and Lerman, J.: The blood picture in exophthalmic goiter and its changes resulting from iodine and operation, J. C. I. 9: 1179, 1932

2. Warthin, A. S.: Pathology of goiter, Proc. Interstate Post Grad. Med. Assn. of N. A., 1929, page 383

3. Halsted, W. S.: An experimental study of the thyroid gland of dogs with especial consideration of hypertrophy of the gland, Johns Hopkins Hosp. Rep. 1: 373, 1896

4. Pemberton, J. de J.: In discussion of "The control of hyperthyroidism following partial thyroidectomy by removal of unusually small amounts of thyroid tissue," by S. F. Haines, Proc. Staff Meet. Mayo Clinic 9: 770, 1934

5. Soley, M. H.: Exophthalmos in patients with various types of goiter, Presented at the Meeting of the American Society for the Study of Internal Secretions, Atlantic City, May 2, 1941

In a large group of industrial workers the proportion of the cases of tuberculosis found in a minimal stage has almost trebled since 1929. Moderately advanced cases have decreased slightly and far advanced cases are about one-third the former proportion. This change is explained largely by the fact that in recent years fluoroscopic examinations of the chest (and roentgenograms when indicated) have been made prior to employment and as part of the annual routine examinations of all employees of the Metropolitan Life Insurance Company. From Bulletin of Met. Life Ins. Co.

Brown rice, which goes through a less extensive milling process than white rice, contains four times as much vitamin B_1 and three times as much minerals as the white variety.

RECENT PROGRESS IN ESTROGEN THERAPY

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With the rapid progress made in endocrinology during the past decade, numerous pure, potent endocrine principles have been made available for therapeutic use. Of these, none has been more useful to both the specialist and general practitioner than the estrogenic substances.

The availability of crystalline highly active estrogens has been of great benefit to large numbers of patients, particularly those suffering from the menopause, either artificial or spontaneous. Active investigation on improving estrogenic therapy is constantly going on. Progress has been definitely made in two respects; in (1) improving on the natural estrogens by various procedures and (2) devising synthetic preparations. In the first method, there is considered a factor which plays a most important role in improving the efficiency of a known estrogen, that is, delaying absorption from the site of injection. In doing this, the estrogens enter the blood stream at a slow, constant rate, thereby avoiding the rapid excretion and destruction which occur when they enter into the blood stream over a short period of time. It is well known in this respect that other therapeutic agents have an increased efficiency when their absorption is retarded, such as with protamine insulin, adrenalin in oil and numerous others. The method of retarding the absorption of estrogens consists of altering them chemically by combining them with fatty acids to form, for example such compounds as estradiol benzoate and estradiol dipropionate. These substances will induce a more protracted estrus in laboratory animals than the simple estradiol. Of these two esters, the dipropionate will induce a far more persistent estrus response than the benzoate which, in turn, will induce a longer estrus period than estradiol. In the human there is little information available about the rates of absorption of these compounds. There is, however, some evidence that estradiol dipropionate after a single injection is excreted over twice as long a period of time as the benzoate. The advantages of using such preparations are obvious. In the first place, the therapeutic effect is undoubtedly increased and, secondly, the beneficial effects will be obtained over a greater period of time, thus necessitating less frequent injections.

A compound of estradiol, namely ethynil estradiol has been made available to investigators for some time. This compound retains much of its estrogenic activity when administered by mouth in contrast to the loss of 90 to 95 per cent of the activity of estradiol administered orally. As yet, however, no extensive reports have appeared regarding the use of this compound in therapeutic practices. In regard to estrone, the first crystallized estrogenic substance, esters of this compound have not been found whose efficiency is increased to any appreciable extent over that of estrone.

The absorption of estrogens may be delayed without altering the chemical state of the estrogens but by placing them in a media which is absorbed slowly; thus oil solutions of estrogens are much more efficacious than water solutions when both are administered in single injections. More recently it has been found that placing tablets or crystals of estrogens directly into the tissues of the patient gives rise to slow, constant absorption into the blood stream inasmuch as these dried materials are only slightly soluble in tissue fluids and, for this reason, they are absorbed slowly. Thus, implants of crystals or pellets of 20 to 40 mg. of either estrone or estradiol will induce a therapeutic effect for up to six months or more. It might be stated that other hormone preparations such as testosterone and desoxycorticosterone implanted directly into the tissues are at least four times as efficient as oil solutions. This, then, would be an ideal method of administering estrogens. Tablets or crystals for implantation are not available for purchase at the present time. One of the disadvantages of this form of therapy is the lack of control of the patient, but this is perhaps not so important for the estrogens as it is for such a substance as desoxycorticosterone where overdosage may be fatal. The technic of implantation is not complicated; a small incision is made in the skin followed by blunt dissection of the subcutaneous tissues and the pellets or crystals deposited. Sterility precautions must be strict. Some investigators have used a trocar for the insertion of pellets of the crystalline material directly under the skin.

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Recently at the Mercy Hospital Dispensary we have experimented with a new type of estrone preparation. We have administered to patients by injection estrone crystals suspended in an aqueous media. In this instance we were interested in having the crystals suspended in a vehicle which would be rapidly absorbed by the tissues, leaving behind a deposit of crystals. The absorption of estrone in this way would be similar to that from small implants of estrone crystals. In this study we have found that the administration of suspensions of estrone containing 5 mg. per cc. injected at weekly intervals for three weeks results in relief of menopausal symptoms for a period of many weeks after the last injection. The average period of relief was about five weeks, but at least one-fourth of our patients had relief for ten or more weeks after the last injection. We have found that aqueous suspensions are much more efficient than suspensions of estrone in oil. Laboratory work which preceded our clinical trials with these suspensions indicated that the estrus in rats induced by aqueous suspensions of estrone was twice as persistent as with the oil suspension which, in turn, was more protracted than with similar quantities of estrone in oil solution. We have concluded on the basis of clinical and laboratory work that aqueous suspensions of estrone are more efficient than oil solutions of estrone. An additional advantage of the aqueous suspension is the absence of possible sensitivity reactions to oil vehicles.

Attempts to prepare synthetic materials with a high degree of estrogenicity have been quite successful. Of the numerous compounds prepared, the most promising up to the present time is diethylstilbestrol. This substance is a stilbene, not a steroid like the natural estrogens, and is completely synthesized by laboratory procedures. This compound when tested in rats by injection was shown to be 1 to 3 times as potent as estrone. A remarkable property of this substance, however, allows for relatively little loss of activity when it is administered orally. By the oral route, its activity in the rat is about equal to that of estrone injected, in contrast to the activity of estrone by mouth which is only about 5 to 10 per cent of that by injection. The convenience and economy of such an orally active estrogen in therapy is obvious. Numerous reports have indicated that stilbestrol is an effective estrogenic substance and possesses all of the properties of the natural estrogens. The disadvantage of stilbestrol is the incidence of toxic effects. The percentage of patients reported to develop such toxic effects varies considerably amongst the investigators who have used stilbestrol. On the average, however, it may be stated that about 15 per cent of the patients develop unpleasant reactions, chiefly nausea with vomiting, dizziness and headaches. It has been indicated on the basis of animal investigation that stilbestrol produces damage to various organs such as the liver and bone marrow, but in the human there has been no adequate demonstration by objective evidence that this substance actually produces injury to the tissues in doses which are far larger than those used for therapeutic purposes. It is noteworthy that many of the patients who complain of nausea and vomiting after stilbestrol administration state that they feel as if they were pregnant. For this reason, it might be suggested that the sudden introduction of potent estrogens into the body fluids of the patient induces a reaction similar to that of morning sickness and that no actual pathological changes have taken place. In this connection, it has been observed that post partum women who receive large doses of stilbestrol rarely, if ever, complain of nausea and vomiting. It is therefore possible that these women have been adjusted to large amounts of estrogens and therefore do not react like normal women to the stilbestrol administration. Additional investigations are required, however, before stilbestrol can be pronounced safe for routine use. When and if this substance becomes available, physicians will have a potent estrogen effective by mouth which will be convenient and economical to administer. Its ease of administration may, however, result in promiscuous therapy and harm may arise from this. If the doses in conditions such as the menopause are restricted to about ½ to 1 mg. daily, there appears to be little possibility that toxic manifestations would arise providing the period of administration is not unnecessarily extended. In this regard, estrogens should be administered for several months, after which there is a rest period until the symptoms return. Therapy should be then repeated with a similar course.

We have recently been investigating the therapeutic efficacy of hexestrol which is a modification of stilbestrol. Several reports in the English literature indicate that its properties are similar to stilbestrol but that the incidence of toxic results is fewer. There are no reports available in the American literature up to the present time. As far as I know the present paper is the first in this country to deal with the therapeutic efficiency of hexestrol. Although the study is not completed, I feel safe in stating that hexestrol is about one-fifth as active in the human as stilbestrol; thus with doses of 3 to 5 mg. daily most menopausal patients will obtain satisfactory relief. Inasmuch as this compound is relatively inexpensive, the necessity of giving these dosages is no serious factor. In our experience, the incidence of toxic reactions is about one-half as great as that with stilbestrol and these reactions are relatively mild. It is only occasionally that the nausea and vomiting resulting from hexestrol necessitates cessation of therapy. It appears, therefore, that hexestrol is promising as an efficient economical estrogen. Before definite conclusions should be drawn, however, a considerable amount of evidence concerning the activity, toxicity and therapeutic efficiency of hexestrol is required.

In conclusion it may be stated that scientists have improved upon nature in regard to the estrogenic hormones. By chemical procedures they have devised more potent substances which are more efficient for therapeutic purposes. It is anticipated that within a short time these products will become available for routine use in the practice of medicine.

Thousands of young men are being examined daily for military service and these physical examinations offer the best opportunity this country has ever had to discover a large part of that vast reservoir of unknown, untreated cases of tuberculosis which keeps the White Plague on the march. Routine X-rays for tuberculosis should be given every man called up for Selective Service.—*Thomas Parran, M. D., Surg. Gen., U. S. Pub. Health Serv.*

All medical students in Argentina in the future must undergo X-ray examination and tuberculin tests on the result of which their permission to study medicine depends.—*Schweizer Med. Woch., June 22, 1940. Noted in Tubercle, January, 1941.*

RAT-BITE AND HAVERHILL FEVERS

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SUMNER

Spirillar rat-bite fever occurs only after the bite of some animal, usually the rat. With a few exceptions, such bites also cause the sporadic form of Haverhill fever. The epidemic form of Haverhill fever, so far reported in only two states, is probably caused by contaminated food, milk being suspected in the epidemic in Haverhill, Massachusetts.[1] An accurate bedside diagnosis is usually possible in these diseases. Failure to remember them in obscure febrile conditions will prevent the investigation of several important clinical and laboratory phases of these infections concerning which we are still uncertain. It will also prevent the patient from receiving the proper treatment, neoarsphenamine. This drug is really a magic bullet in Spirillum minus infections and gives promise of being useful in Haverhill fever. It is of interest to note, in this connection, that Spirochaeta laverani, used by Ehrlich while working on the arsphenamines, and Spirillum minus, are probably identical organisms.[2]

The purpose of this paper is: to mention controversial points concerning these two infections; to describe the important clinical features of each and to note the clinical differences; and to serve as a reminder that these diseases have occurred in Illinois and should be remembered in fevers of obscure origin. Three cases are reported.

Wounds caused by rat bites are relatively uncommon, often heal quickly and as a rule, are not followed by infections. If an illness does appear after several days have elapsed, the patient and the physician may entirely overlook the relation existing between the bite and the disease which has followed. This diagnostic oversight, coupled with the natural rarity of rat-bite infection, increases its reputation as a curiosity. However it probably occurs much more frequently than we suspect. Three out of four patients whom we have treated following rat bites have

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had these infections. In 1929 five cases were diagnosed in one southern county after the attention of the local physicians was directed to the disease.

Infections following rat bites have been recognized for centuries in Asia and are now seen throughout most of the World. Wilcox reported a case in Louisiana in 1839, and since that time more than one hundred cases have been recorded in this country. As the etiological agent was unknown the term "rat-bite fever" has been used until recently for any infection following a rat bite. In 1914 Schottmuller reported a case in Germany in which a streptothrix was found in blood cultures, and in 1916 a similar case was reported in this country by Blake.[3] In Japan, Futaki[4] isolated an organism which he named *Spirochaeta morsus muris* in one of these infections in 1916.

Since then first one and then the other of these organisms have been found in these cases, and this has led to much confusion and controversy concerning the true cause of the disease. In a few cases both have been found, and occasionally other organisms, such as streptococci, have been isolated and suspected of causing the infection. One investigator suggested that all cases may be caused primarily by the Spirochaeta morsus muris, now called Spirillum minus, and that the streptothrix, now called Haverhillia multiformis (Streptobacillus moniliformis) is a secondary invader. On the other hand Dawson and Hobby[5] think that it is inadvisable to admit that Spirillum minus causes the infection without careful investigation. They base this opinion on reports of Francis[6] and others which show that many laboratory animals used in making a diagnosis are already naturally infected with Spirillum minus before being injected with the suspected blood, and suggest that this fact makes the spirillar theory of infection doubtful. They report two cases in which only Streptobacillus moniliformis was found although the clinical course was much like a spirillar infection. However a mild polyarthritis was seen in each case.

Pleuropneumonia-like organisms have been reported by Klieneberger[7] in cultures of Streptobacillus moniliformis (Haverhillia multiformis). She considered this an example of natural symbiosis. Dawson and Hobby[5] followed her methods carefully and found this organism, but thinks that it is only a variant phase of Streptobacillus moniliformis. Pleuropneumonia-like organisms have also been found in exudates in acute rheumatic fever, but Swift[8] thinks they probably originated in the laboratory mice used during this work.

Marked clinical variations have always been noticed in case reports of rat-bite infections and this has added to the confusion mentioned above. Some have thought that such variations are to be expected in any disease. In these infections, however, the variations were so marked that two distinct clinical pictures have gradually emerged from the confusion. Competent observers, such as Allbritten[9] and his associates, and others, have collected enough evidence to make them feel sure that we are dealing with two distinct diseases, one caused by Spirillum minus, and the second by Haverhillia multiformis (Streptobacillus moniliformis). If this is correct it will go far towards explaining the different clinical and laboratory findings. It is now believed that Haverhillia multiformis is the same organism as the Streptothrix described by Schottmuller in 1914 and by Blake in 1916. Similar streptothrix infections were reported in Chicago in 1918 by Dick and Tunnicliff[10] following a weasel bite, and by Tunnicliff and Mayer,[11] following a rat bite. In 1938 Farrell[12] and associates summarized fourteen infections in which Haverhillia multiformis or similar organisms have been found in the blood or joint fluids.

The first clinical entity, caused by the Spirillum minus, will probably continue to be called rat-bite fever or Sodoku.[13] The second, caused by Haverhillia multiformis (Streptobacillus moniliformis) has only recently been identified and is called Haverhillia multiformis septicemia, or sporadic Haverhill fever. This organism has been isolated from the blood and joint exudates in several infections folowing rat bites,[12] and from the same sources by Parker and Hudson[14] in epidemic Haverhill fever. It causes both the epidemic and sporadic forms of this disease, which are identical excepting the manner in which infection occurs. Place and Sutton[15] described the epidemic which occurred in Haverhill, Massachusetts in January 1926, hence the name, and refer to another occurring in Chester, Pennsylvania in May and June, 1925, which was studied by Armstrong. Hazard[16] and Goodkind

suggested in 1932 that rat bites could cause sporadic cases of Haverhill fever. Scharles and Seastone[17] reported such a case in 1934. Strangeways[18] reported that Haverhillia multiformis is often found in the nasopharynx of rats. It is possible that food may be contaminated from this source thus producing epidemics or sporadic attacks of the disease.

Spirillar infection in wild rats varies from two to twenty-one percent in various colonies (Bayne-Jones).[13] Hans Zinsser[19] found many infected rats in Boston and was surprised that more cases were not seen in human beings. Ford[19] reports many infected rats in Baltimore, and the same condition is probably present throughout the country. Other animals which may transmit the disease are the field mouse, ferret, cat, squirrel and weasel. Laboratory workers are frequently infected when bitten by rats and mice. Ripley and Van Sant[20] reported two medical students in Chicago who were infected while operating on a dog. Individuals sleeping on or near the floor in rat-infested premises are most likely to be bitten and infected.[19] Many people are forced to sleep in basements, subways, and bombproof shelters during modern wars and this should make the disease more prevalent.

In rat-bite fever caused by Spirillum minus (sodoku) the wound caused by the bite, usually heals by first intention. After a five to twenty-five day incubation period (generally about two weeks) the initial wound becomes red and painful, blisters may appear, and eventually ulceration occurs. The ulcer has a clean surface and a serous discharge. It often resembles an extragenital chancre and heals very slowly (Arkin). Pus in the discharge often indicates that some other organism is causing the disease or is acting as a secondary invader. These local changes are accompanied by a lymphangitis with regional lymph node involvement somewhat like that seen in tularemia. A hard chill usually occurs about the time the local changes are noticed. This is accompanied by generalized muscular aching and pain. The fever rises rapidly to 104 or 105 degrees, lasts two or three days and then quickly drops to normal or below and is followed by a drenching sweat. These chills recur at intervals of three or four days to a week and may go on for months if the disease is not recognized and properly treated. Soon after the onset of the disease the typical eruption, one of the outstanding characteristics of the infection, appears. After each chill large reddish-purple maculopapular spots appear on the skin at various places including the face. Some are two or three inches in diameter, others only as large as a dime. As the fever subsides after each chill these spots gradually fade out, but return after the next chill. Between chills the patient may feel very well but as the disease continues, weakness and emaciation become more marked until in unfavorable cases, a state of exhaustion finally supervenes. The reported mortality varies from two to ten percent.

In sporadic Haverhill fever (Haverhillia multiformis septicemia) the rat bite usually heals promptly and as a rule, the wound subsequently shows little if any reaction at any time. After a three to five day incubation period the invasion begins and the clinical course is exactly like that of Epidemic Haverhill fever. The onset is sudden and generally very severe. Nausea and vomiting are early complaints. Other prominant symptoms are chills, backache, general muscular pain, and headache. The initial fever may reach 105 or 106 degrees and frequently causes delirium. This fever falls rather abruptly sometime during the following two to five days with marked improvement in the other symptoms, the patient often feeling so well that he gets out of bed, and may even return to work. A rash is seen in practically all cases, appearing on the second, third or fourth day of the disease. It is "rubellaform to morbilliform" in appearance, is seen chiefly on the extensor surfaces of the extremities, and about the joints. In severe cases the distribution is more general. It lasts from one or two to eight days and desquamation may follow. A secondary rise in temperature occurs in from one to three days after the initial fever drops and is quickly followed by a polyarthritis which commonly appears on the fourth or fifth day of the disease. This arthritis has appeared on the second day of the disease and also as late as the thirteenth day. It may persist for weeks or months, the fever running a curve somewhat like that seen in typhoid fever, only with greater daily variations. During this period the disease is easily confused with acute rheumatic fever. Sore throat is seen in half of the cases, appearing most often about

the eighth day. Some patients have bronchitis. The death rate is unknown but very low.

CASE REPORT 1

Clinical diagnosis: Spirillar rate-bite fever.

E. B. Age eight years. Past history unimportant. General physical condition good. Bitten by rat on dorsum of right foot on September 18, 1928. One week later a red spot appeared a few inches above the wound, which had apparently healed. On September 30 he had a hard chill. The region around the bite became inflamed, painful and later ulcerated. The inguinal lymph nodes were enlarged and tender. Later some enlargement was noted in all superficial lymph nodes. Headache and general muscular pain were severe. The fever dropped in two days and a profuse sweat occurred. The chills appeared about every fourth or fifth day after this, the fever lasted for twenty-four to forty-eight hours, dropped quickly and a drenching sweat always followed. The typical rash appeared soon after each chill and gradually faded out after the fever dropped. The larger spots were two inches in diameter. The eruption was purple or a reddish-purple and was generally distributed, including the face. During the second month the chills came every six or seven days. On the 24th of November the fever reached 105.4 and on December 1st 105.2 degrees. The pulse was very rapid. The only important physical findings were the marked exhaustion and emaciation which were becoming more pronounced after each chill. The hemoglobin was 55%, R.B.C. 3,200,000 and W.B.C. 11,500. No malarial parasites or spirilla were found in stained blood smears. Agglutination tests for typhoid and undulant fever were negative. Guinea pigs were inoculated with blood taken during a chill but no spirilla were found, possibly because of unfamiliarity with the technique.

This boy had no arthritis at any time. He had been treated for typhoid, malaria and various other diseases. .2 gm. of neoarsphenamine on December 18th and December 23rd stopped the chills at once. There was no recurrence of fever and the convalescence was rapid.

CASE REPORT 2

Clinical diagnosis: Spirillar rat-bite fever.

A second patient, seen in consultation soon after this, had been bitten by a rat on the thumb while moving a pile of lumber. The disease came on in about two weeks after the bite and ran a course much like that reported in Case No. 1. The diagnosis was made early in this case and the disease was stopped immediately after using neoarsphenamine. No arthritis appeared in this case. The Wasserman report was positive, but syphilis could not be ruled out.

CASE REPORT 3

Clinical diagnosis: Sporadic Haverhill fever following a rat bite.

Mrs. L. T. age 52 years. Past history unimportant. Physical condition good. Was bitten on right thumb by a rat at 1. A.M. May 3, 1940. On May 7th complained of being tired, refused evening meal and at 7 P.M. had a hard chill followed by fever. Nausea was severe but she could not vomit. One of us (C.G.S.) examined her at 9 P.M. Complaints, chilly, aching and feverish. The temperature was 101.6 Her neck was stiff. Tenderness noted in lower left abdominal quadrant. The rat bite had healed and was covered by a dry scab. No local reaction or adenitis occurred. A rash resembling measles appeared on May 8. Distribution — chiefly on the extremities. The fever then dropped and the general condition was much improved. Moderate general abdominal tenderness was present, but disappeared on May 10th following a laxative. The rash faded out on May 11.

The fever returned on May 10, the patient complaining about moderately severe pain in her back and right elbow. On May 11, her right ankle was so painful and sensitive that she could not walk. The temperature ranged from 101 to 103 degrees. The polyarthritis then attacked various joints including the left knee, left ankle, and wrist, the right elbow, right tarsal and metatarsal, and right temperomandibular joints. The right wrist was swollen, very red and sensitive. Soft crepitus appeared in the left shoulder. Various other joints were involved, some improving, some getting worse. The right ankle was red and distended with fluid during the latter part of May. A pharyngitis appeared on May 20. A week later this was getting "worse and worse," the left anterior pillar and posterior wall of the pharynx were red, and a chain of enlarged glands appeared in the right cervical region. Some hoarseness was present. The throat was better by June 7th and the joints showed some improvement. She complained of soreness all over the body. Temperature ranged from normal to 102 degrees. A drenching sweat occurred on June 8th. On the 11th she had severe pain in both arms. She was very weak. The appetite was improving but the arthritis was still active.

Neoarsphenamine was started on June 16, beginning with .15 gm. and seemed to help immediately. Doses of .3 gm. were given at four to seven day intervals until July 17th with steady improvement after the first dose. A total of 2.1 grams was used. The patient could walk around in the house by July 6th and after that her progress was satisfactory.

Laboratory findings were unimportant. The hemoglobin averaged from 70 to 80%. W.B.C. count about 7,000. The urine showed a trace of albumin and a few pus cells on one occasion. A diagnosis of acute rheumatic fever was considered at first, but later the entire picture was so typical of sporadic Haverhill fever that, unfortunately, blood cultures were not made. There was no indication of heart damage at any time.

The paper of Allbritten[9] and his associates gives an excellent outline of laboratory procedures required in the differential diagnosis of rat-bite and Haverhill fevers.

SUMMARY

1. Present information concerning rat-bite and Haverhill fever is incomplete, and some points are controversial.

2. These infections will be overlooked, thus preventing needed research, if we are not familiar with the main clinical features of each.

3. Rat-bite fever caused by Spirillum minus always follows an animal bite. The incubation period is about two weeks, is followed by a chancre-like ulcer around the initial wound, and regional lymphangitis and adenitis occur. The characteristic course consists of a series of chills at four to seven day intervals. A reddish-purple eruption accompanies each chill. The spots may be two or three inches in diameter. The disease is promptly stopped by neoarsphenamine. Arthritis is not seen.

4. Haverhill fever may or may not follow an animal bite and epidemics may occur. The incubation period is short (usually three or four days). If caused by a bite there is subsequently little or no reaction around the wound. The measles-like rash comes a day or so after the initial fever and may become petechial. After fading it seldom returns. A secondary fever and polyarthritis appear soon after the initial fever subsides and may last for weeks. The secondary fever is irregular but persistent. It may resemble the spirillar type. The response to neoarsphenamine is uncertain but the drug should be tried.

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REFERENCES

1. Place, E. H.; Sutton, L. E.; and Willner, Otto: Erythema Arthriticum Epidemicum; Preliminary Report, Boston M. & S. J. 194: 285 (Feb. 18) 1926.

2. McDermott, E. N.: Rat-bite Fever: Study of Experimental Disease with Critical Review of Literature, Quart. J. Med. 21: 433 (April) 1928.

3. Blake, F. G.: Jour. Exper. Med. 23: 39, 1916.

4. Futaki, K.; Takaki, F.; Taniguchi, T., and Osumi, S.: The Cause of Rat-Bite Fever, J. Exper. Med. 23: 249 (Feb.) 1916.

5. Dawson, M. H., and Hobby, G. L.: Transactions, Assoc. American Physicians, 54: 329, 1939.

6. Francis, E. J.: Rat-Bite Fever Spirochetes in Naturally Infected White Mice, U.S.P.H. Reports, 51: 976-977, 1936.

7. Klieneberger, Emmy: The Natural Occurrence of Pleuropneumonia-like Organisms in Apparent Symbiosis with Streptobacillus Moniliformis and Other Bacteria, J. Path. & Bact. 40: 93 (Jan.) 1935.

8. Swift, H. F.: Rheumatic Fever, Cecil, Textbook of Medicine, 5th Ed. P. 500.

9. Allbritten, F. F.; Sheely, R. F.: and Jeffers, W. A.: Haverhillia Multiformis Septicemia, J.A.M.A. 114: 2360-2363 (June 15) 1940.

10. Dick, G. F., and Tunnicliff, R.: A Streptothrix Isolated from the Blood of a Patient Bitten by a Weasel (Streptothrix Putorii), J. Infect. Dis. 23: 183, 1918.

11. Tunnicliff, R., and Mayer, K. M.: A Case of Rat-Bite Fever, J. Infect. Dis. 23: 555, 1918.

12. Farrel, Elliston; Lordi, G. H.; and Vogel, Joseph: Haverhill Fever: Report of a Case with Review of the Literature, Arch. Int. Med. 64: 1 (July) 1939.

13. Bayne-Jones, S.: Rat-Bite Fever, Cecil, Textbook of Med. 5th Ed. P. 413.

14. Parker, F. Jr., and Hudson, M. P.: The Etiology of Haverhill Fever (Erythema Arthriticum Epidemicum), Am. J. Path. 2: 357 (Spt.) 1926.

15. Place, E. H., and Sutton, L. E.: Erythema Arthriticum Epidemicum (Haverhill Fever), Arch. Int. Med. 54: 659 (Nov.) 1934.

16. Hazard, J. B., and Goodkind, R.: Haverhill Fever (Erythema Arthriticum Epidemicum) J.A.M.A. 99: 534-538 (Aug. 13) 1932.

17. Scharles, F. H., and Seastone, C. V., Jr.: Haverhill Fever Following Rat-Bite, N. Eng. J. Med. 211: 711 (Oct. 18) 1934.

18. Strangeways, W. I.: Rats as Carriers of Streptobacillus Moniliformis, J. Path. & Bact. 37: 45 (July) 1933.

19. Francis, E. J.: Trans. Assoc. of American Physicians, 47: 143-149, 1932. Also Zinsser, Hans, and Ford, W. W., Discussions.

20. Ripley, Herbert S., and Van Sant, Helen M.: Rat-Bite Fever Acquired from a Dog, J.A.M.A. 102: 1917-1921 (June) 1934.

A CLINICAL APPROACH TO THE ROENTGEN DIAGNOSIS OF CARCINOMA OF THE COLON

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Stimulated by the pioneer work of George E. Pfahler and Fedor Haenisch, the writer began the roentgenological study of the colon more than thirty years ago. The roentgenological technic of that day, modified and elaborated, particularly by the contributions of Forssell, Fischer, Akerlund, Berg, Chaoul, Schwarz, Gilbert, Weber, Gershon-Cohen, and others, has been described in a previous paper* and the reader is referred to it for details of technic to which allusion may be made in subsequent pages of this presentation. The present communication deals with the roentgen evidences of carcinoma of the colon, not including the rectum.

Of all carcinomas found in the body about 15 per cent are located in the large intestine. About two-thirds of these occur after the age of fifty years, but one is struck with the number of cases in individuals of thirty or younger. These younger cases are characterized by shorter dura-

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*CASE, James T. Comparison of methods of roentgen examination of the colon. J.A.M.A. 108: 2028-2034 (June 12), 1937.

tion of symptoms, a higher index of malignancy, greater frequency of metastases and inoperable tumors, and a diminished proportion of good results as judged by five-year survivals.

Although the actual cause of carcinoma of the large bowel remains obscure, as is true of carcinoma in general, there has been important progress in the recognition of predisposing and contributing factors. The significance of untreated benign lesions as an occasional predisposing cause has been emphasized by Curtis Rosser, among others. Ewing is skeptical as to the etiological importance of fissures, fistulas, hemorrhoids, and ulcerative lesions. It has been claimed that constipation plays no important part in the evolution of carcinoma of the bowel. Emphasis has been placed on the fact that constipation is more common in women, yet they suffer less than men from carcinoma of the colon. The anal canal is very rarely the site of carcinoma, although it is the part most likely to become irritated by the passage of hardened retained fecal materials. However, it must not be overlooked that the cecum and the rectosigmoid are the most common sites of colonic stasis and they are also hosts of the great majority of carcinomas of the large intestine. Cancers of the colon originate in the crypt cells. While all carcinomas of the colon may not originate in polyps, evidence is accumulating that most of them have their origin in just that way. The menace of colonic cancer may best be reduced by early recognition of the presence of polyps before they have had time to undergo malignant degeneration or while this degenerative change is still in such an early stage of development that their prompt resection may offer reasonable expectation of cure. Their menace as potential carcinomas is enhanced by a history of familial predisposition to polyposis.

Benign tumors of the colon, other than benign polyps, are exceedingly rare and as a rule are not recognized since they are generally small and do not cause cachexia and other symptoms of a general character. They may cause intussusception. For the most part they consist of fibromas and hemangiomas; lipomas and neurofibromas are very infrequent. Intussusception may cause alarming symptoms and endanger life. Differentiation between large benign and malignant tumors is often difficult. All colonic tumors should be considered and treated as malignant, since their malignant nature cannot be disproved.

Most cancers of the large bowel belong to the classification of adenocarcinoma, the squamous cell tumors being found almost exclusively in the lower rectum and anus. According to Rankin, the adenocarcinomas may be classified as medullary adenocarcinoma, scirrhous or fibrocarcinoma, mucinous (colloid) carcinoma, papillomatous carcinoma, squamous carcinoma, and melanoma. All originate in the crypt cells or glands of Lieberkühn.

In the proximal colon (cecum, ascending and right half of the transverse) obstructing tumors are not common, since the lumen of the bowel here is two or three times that of the distal colon. The tumors are usually of the medullary type, involving the posterior wall more often than the anterior, large, fungating, friable, tending to ulceration, with a disposition to invade the bowel wall rather than to encircle its lumen. Including cancers of the rectum, Karsner and Clark's analysis of a series of 104 malignant tumors of the colon showed annular lesions in 57 per cent of rectal cancers, 82 per cent of sigmoid cancers, and 61 per cent of upper colon cancers, while of seven carcinomas of the cecum none were annular. Local extension of the lesion is infrequent. Metastases from cecal cancers were found in 32 per cent of Craig and MacCarty's series of one hundred cases.

In the distal colon carcinomas have somewhat different characteristics, being usually scirrhotic, tending to constriction, many of them of the napkin-ring type, ultimately encircling the bowel and producing obstruction. Sometimes the obstruction is acute. The truly band-like napkin-ring types are occasionally associated with enormous dilatation of the chronically obstructed bowel proximal to the narrow band of constriction, constituting a veritable megacolon. The distal colon is also more likely to harbor the papillomatous tumors, usually of a relatively low grade of malignancy, though they may attain to large proportions. Bleeding is more common with left colon lesions. Later stages of all these lesions are accompanied by ulceration, invasion of surrounding tissues, and secondary infection. Carcinoma of the transverse colon sometimes shows invasion of the stomach. In some of our cases a spontaneous gastrocolic fistula resulted

from such an invasion. We have twice encountered two independent carcinomas in the same colon.

Polypoid growths are potentially malignant. Fitzgibbon and Rankin classify colonic polyps in three major divisions:

Group I. This group includes those polyps in which the epithelium retains its normal characteristics. They are usually roughly nodular, surrounded by evidences of slight hyperplasia. Their size varies from 3 millimeters to masses measuring 10 to 20 millimeters in diameter. Invariably pedunculated, they show no tendency to branching or papillary forms. In the bowel they act like foreign bodies; they ulcerate and they may be torn off by the forces of peristaltic action. Usually they run a benign course over a long period and are no more likely to become malignant than normal intestinal mucous membrane.

Group II. This group shows abrupt and striking structural changes in epithelial and connective tissue elements, with evident failure of proliferating cells to differentiate completely. They are also invariably pedunculated and attain a size of 5 or 6 centimeters with pedicles of equal length. Sessile tumors are also found — flattened, hemispherical excrescences with overhanging edges concealing the stalk of the pedicle. All the large-size tumors fall into this group which therefore includes most of the polyps of the large bowel. However, they are not consistently benign. Some on section may show a microscopic area of definite carcinoma. The development of malignant changes is apparently dependent upon the rate at which the tumor grows; with rapid growth it is only a question of time until carcinoma appears.

Group III. Failure of differentiation of the epithelium characterizes this group as in Group II, but this classification is limited to those tumors where the epithelial differentiation has been arrested so early that only the most rudimentary characteristics of normal mucosa have been attained. Group III are modified forms of Group II. Polyps of this group reach the size of 6 to 9 millimeters, the size of a split pea, scarcely ever larger, and have begun their malignant change before the forces of peristaltic activity have had time to influence them. There is early involvement of the submucous layers. Rankin believes that many, if not most, of the carcinomas of the colon develop through proliferations of Group III.

Generally, polyps must be considered as potentially malignant or precancerous. Karsner and Clark believe that 40 per cent of adult cases of polyposis become malignant. Polypi constitute the most frequent precancerous lesions.

The clinical symptoms of carcinoma of the colon are extraordinarily varied. Really there are no symptoms which might be designated as in themselves distinctive of colonic cancer. Emaciation does not occur until late; on the contrary, there is an obesity in many instances. Many complain of symptoms which they refer to the stomach, such as a feeling of fullness and a lack of appetite. In such patients, if the roentgen study of the stomach proves negative, the examination should be continued to include the colon, both by a study of the opaque residues of the meal and by an opaque enema study, with such elaborations of technic as may seem indicated in the particular case. And even when the symptoms indicate the presence of a cancer somewhere in the colon, careful proctoscopic and sigmoidscopic and roentgenological studies are required to determine the nature and exact site of the lesion. The average patient, when first diagnosed as having definitely a colonic neoplasm, gives a history which in retrospect can be dated back nearly a year. Furthermore, the colon is the seat of various other affections whose symptoms resemble those of colonic carcinoma. In positive cases the site and gross characteristics of the tumor will cause wide variation in the clinical manifestations, depending on the presence or lack of secondary mechanical symptoms, ulceration, perforation, metastases, secondary infection, etc.

In general, the symptoms can be discussed under two heads, according to the situation of the lesion, whether in the right (proximal) or distal colon. In the right half of the colon, especially in the cecum, the liquid content of the bowel, the predominance of non-obstructing, large, ulcerating growths and the large diameter of the intestine combine to give prominence to dyspeptic symptoms of persisting epigastric distress and local right-sided tenderness, anemia often unassociated with loss of blood, and weakness, and frequently a palpable mass with conspicuous ab-

sence of alternating constipation and diarrhea. A palpable tumor has been found in about half of the cases. The size of the growth usually is in direct ratio to the degree of anemia. In Rosser's series, gross bleeding occurred in 14 per cent of cecal tumors as compared with 78 per cent for lesions of the distal colon. In the hepatic flexure carcinoma of the colon gives rise to symptoms which are similar, sometimes with the addition of signs of obstruction.

In lesions of the distal colon, the predominant symptoms are of obstructive character, because of the greater tendency to encircling growths and a considerably less liquid content of the bowel. The obstruction is usually progressively chronic, with only an occasional case of acute obstruction. Acute stoppage may be superimposed on a chronic stenosis and appear to have developed rather suddenly. This is understood when one considers that the actual lumen of the bowel under progressive constriction is reduced in greater proportion than the reduction of the diameter might suggest. Along with the chronic progressive obstruction there occurs an increasing dehydration, intestinal intoxication, and general lowering of the patient's resisting powers. The augmenting constipation results in gas distension, transverse colicky pains in the epigastrium, gurgling sounds of gas passing from one segment of the bowel into another through spastic contraction rings of peristalsis and antiperistalsis, and finally loose movements, alone or alternating with constipation. Pain is not an outstanding symptom, although the radiating transverse discomfort due to the peristaltic unrest may be mentioned. Bleeding is a cardinal sign of distal colon lesions.

A consideration of these symptoms has been given in some detail in this paper for the reason that the roentgen study, always indispensable in the search for colonic pathology, cannot be carried out to best advantage unless the radiologist is acquainted with these signs and symptoms, so that he may concentrate his efforts and modify his technic according to the probable site of the disease. The radiologist cannot diagnose the cases any earlier than they are referred to him. Patients should be awakened to earlier complaint about dyspeptic symptoms or at least to routine submission to periodical health examinations which should be done very carefully with careful check on the symptoms above noted so that the attending physician may recognize warning signals.

The roentgenological detection of colonic neoplasms depends upon some alteration of the bowel wall, affecting its lumen or its elasticity, which can be recognized as more or less of a filling defect, perhaps involving only the mucosal pattern, but more likely, when discovered, to have already invaded the submucous and muscular layers. The first roentgenological sign may be a localized rigidity of a segment of the intestinal wall. According to the location of the tumor in relation to the proximal or distal colon, there may be a certain amount of obstruction, though not in the early lesions. If the obstruction is of high degree, the filling defect caused by the neoplastic tissue protruding into the lumen will be augmented by accumulated non-opaque fecal material proximal to the stenosis. There may be a palpable tumor; if so, under fluoroscopically controlled manual examination it will be seen to coincide with the filling defect. These are the roentgenological signs of a gross degree of tumefaction which could hardly escape detection on the routine study of the colon fully distended by the ordinary opaque enema.

The recognition of earlier phases of the disease will, however, require a much more painstaking and time-consuming effort. In all these cases there is a period of expected lag from the beginning of the earliest malignant cellular change until such time as the growth of the malignant cells has caused enough organic alteration to permit roentgenological detection.

One wonders if we ever find a really early colonic carcinoma except by chance. By the time the diagnosis is made in the average case, we find on carefully interrogating the patient that he admits symptoms which date back nearly a year. The lesion is scarcely to be termed early. Schwarz reported a case in which he found suspicious areas to which he called attention but which in the light of some previous experiences he hesitated to pronounce malignant; after an interval of five months the patient came in for re-examination, the lesion was confirmed and operated with the discovery of an inoperable carcinoma. So he urges that not over six weeks be allowed to intervene between the

finding of an area which arouses suspicion and the confirmatory examination. And yet, there are scores of our cases which were manifestly not early who have survived resection for fifteen or twenty years or more. Failure to perceive a colonic carcinoma when it is very early and small does not mean that operation does not promise a high probability of permanent cure. For that matter, there is no regular relationship between the size of the tumor and the outlook for cure after surgical removal, in the sense that large growths offer a poorer prognosis than small ones. Indeed, the highly malignant growths manifest early extension and metastases while the tumor is still small, not yet having had time to grow to larger proportions, whereas the tumor of a lower grade of malignancy may achieve large dimensions before metastases begin.

Two principal factors are indispensable for the early detection of colonic neoplasms by roentgen study: (1) The adoption of a carefully chosen and meticulously followed technic, and (2) the personal equation of the examining radiologist, his experience, versatility, persistence, technical dexterity, and resourcefulness in utilizing the various possible modifications of technic in his examination. Many have the idea that the roentgen study of the colon is more or less standardized, as are so many of the procedures of the ordinary clinical laboratory. The x-ray office or department is not a laboratory in that sense at all, but a consultant's office, provided with the necessary equipment for a wide variation of technic in examination with the x-rays. It follows, then, that the radiologist, like any other medical consultant, should have at his disposal all the knowledge previously gained about the case in hand.

For instance, if it seems that the lesion is situated in the sigmoid, by reason of physical findings, presence of bright blood, obstructive signs, history of inability to take anything more than small enemas, etc., he will be careful not to fill the entire colon at first, but, in order to avoid overlapping of shadows from the proximal colon he will fill only the sigmoid and the first part of the descending colon with the opaque material, study it carefully, make aimed radiographic exposures on the fluoroscopic table with compression or turning of the patient, and then allow the opaque material to be discharged. Perhaps he will fill it again and make further studies or inject with air, all the while turning and manipulating the patient to bring out every inch of the suspected bowel into relief. Directly lateral exposures of the rectosigmoid are sometimes very informing. Or, if the cecum and ascending colon are under suspicion because of a palpable tumor, signs of old blood or mucopurulent material, anemia, emaciation or localized distress in the proximal colon, the radiologist will be extremely careful not to fill the cecum so much as to allow visualization of the terminal ileum whose loops may overlap and confuse the cecal shadows.

Preliminary digital examination of the rectum, and preferably also a proctoscopic or, better yet, a sigmoidscopic study, should precede the administration of the opaque enema as an invariable routine. The findings of this rectal study should also be communicated to the radiologist, so that he may plan accordingly.

In the average colon examination with the opaque enema in cases whose symptoms do not specially indicate a colonic lesion, it may be justifiable to conduct the examination in routine fashion without special preparation of the patient; but if the preliminary study with the endoscope has shown rectal or rectosigmoidal ulceration or polypi or a pinkish discoloration of the bowel contents, he will wish to prepare the patient's colon by cleansing enemas the night before and perhaps also on the morning of the colonic study, providing not less than two or three hours elapse between the administration of the cleansing enemas and the x-ray study. It is highly desirable to have a "dry" bowel for x-ray study. The desirable preparation would be that which one would give the colon in preparation for a colonic resection. If endoscopic study is not done before the x-ray examination, it may have to be postponed for several days until the barium residues have been discharged.

The cecum, ascending colon, most of the transverse and descending colon and the middle of the sigmoid offer splendid opportunity for palpation under screen control with the hand carefully protected with a lead-rubber glove or with a wooden, specially shaped palpator which will permit the hand to remain safely protected by the leaded glass of the screen. If the cecum lies too low, it can be raised up by a combination of

tilting the table, having the patient exhale forcibly and by external manipulation, sometimes aided by injection of the sigmoid with air or liquid to cause it to lift up the cecum within reach of the palpating hand. The sigmoid can best be studied in obliquity, right or left as suits the case, and by straight lateral aimed film studies with the patient turned squarely upon the side, preferably before the rest of the colon is filled, a practice which we have observed for more than thirty years.

In selecting the method of examination in a given case, attention must be given to the probable value of the oral as contrasted with the clysma method. The opaque materials administered by mouth become more or less dried out before they reach the distal portion of the colon, and it is in relatively few instances that one obtains as much information concerning a colonic lesion by the oral as by the injection method. Generally the opaque enema, alone or in combination with the various stages of the air-injection method, will be chosen. It gives immediate information without the delays necessary for the opaque meal residues to reach the colon, and it is a means which is more elastic and variable than the opaque meal. It has been argued that one should never give the opaque meal in the presence of probable colonic obstruction; but that is not necessarily so, for umbrathor (aqueous solution of thorium dioxide) is available for oral use, and it never goes out of solution; the shadow cast is indistinguishable from that afforded by barium preparations. Indeed, umbrathor is rather useful for bringing out the mucosal relief patterns in the enema studies, though somewhat expensive for that purpose and no better than simple suspensions of barium sulphate made up with mucilage of acacia, or glycerine, or other similar materials.

The roentgen findings in colonic carcinoma will vary according to the situation of the tumor in the right or left half of the organ. In the right or proximal colon, filling defects constitute the most common finding, whereas the left or distal colon exhibits the larger number of obstructive lesions. The smaller the lesion the more the difficulty in demonstrating a filling defect; and in the left colon obstruction may not as yet have supervened. The technic of controlled palpation under the fluoroscopic screen with the hand encased in a lead-rubber glove or with the wooden palpator may be varied to suit any segment of the colon except the right and left flexures which are protected from palpation by the costal margin. It is not always possible to palpate the sigmoid; the rectosigmoid and the rectum usually entirely evade palpation. It is well to study the visualized colon foot by foot, indeed inch by inch, as the opaque enema ascends, and to avoid overfilling lest the terminal ileum may also fill and its coils interfere with the post-evacuation study of the cecal and sigmoidal areas. It may be that the routine opaque enema is sufficient and that the lesion can be located and estimated as to size, mobility, coincidence with a pain point and degree of obstruction if any. The patient is then allowed to expel the enema, or better yet the enema is allowed to escape into a waste-pail, and numerous aimed fluorographic small films as well as ordinary large radiographic films are made as record. These often prove highly interesting, and from them one may draw conclusions of value as to the presence or absence of an organic lesion. These studies made after the colon has contracted its lumen are often more informing than the films made while the colon is distended with the opaque enema, the mucosal relief being brought out in considerable detail. Often it is desirable to inject with air after a satisfactory emptying study has been made. If it is decided to inject air by rectum, the greatest care should be exercised to accomplish air distension under screen observation so as to avoid overdilating the intestine, not because of any great danger of rupture but because the overdilated bowel does not afford as much information as one less distended, and it is not desirable to force air through the ileocecal valve into the terminal ileum where it not only causes interference with interpretation of the colonic shadows but it also causes the patient to experience a sickening feeling, sometimes colic and often vomiting. Stereoscopic film records are perferable after this air distension, since the stereograms permit more reliable interpretation than the single films. The air-distended loops of bowel cast very confusing shadows.

The more complicated combined technic, which is beyond question time-consuming and

often very inconvenient, is particularly indicated when there is a question of polyps or ulcerations. It is not a necessary procedure for the detection of diverticula and only occasionally does it bring out additional information concerning carcinoma. But since such a high percentage of malignant lesions of the colon grow out of polypoid degenerating tumors, it is recommended that the combined method be employed whenever the clinician really feels that carcinoma of the large bowel must be excluded.

One of the most valuable signs of polypoid intestinal growths is intermittent intussusception. Colo-colonic invagination nearly always has carcinoma as a cause, though it may rarely be a pedunculated lipoma. The tumor is seized by the movements of peristalsis and protruded into the aboral segment of the colon where it causes obstruction. The funnel-shaped intussusceptum is pushed into the invaginating segment, so that the lower bowel segment, as visualized by the opaque enema, ends in a goblet-shaped concave shadow partially surrounding the non-opaque end of the upper segment. We have succeeded several times in bringing about a successful diagnosis of colonic neoplasm in an early stage by assuming that each of these colo-colonic invaginations is accompanied by a polypoid tumor, invisible on the films.

It is fair to postulate that when the roentgen study reveals evidence of a tumor in the colon, this tumor should be considered malignant unless proved otherwise. Three quarters of the cases which come to surgery for the colon have a diagnosis of carcinoma. A well-trained and experienced roentgenologist should succeed in identifying the malignancy of a colonic tumor in upwards of 90 per cent of cases. Indeed, Rankin relates that Weber made a correct diagnosis of 99 out of 102 organic lesions of the large bowel proximal to the middle of the sigmoid flexure, as proved by operation. To equal this record, one must bear in mind the possibility of hyperplastic tuberculosis, segmented chronic ulcerative colitis, sarcoma, benign tumor, diverticulitis, actinomycosis, and possibly other lesions. But with the exception of diverticulitis these are rare as compared with carcinoma. In a series of 542 cases of surgical diseases of the large intestine and rectum (Mayo Clinic), carcinoma was found 369 times, whereas tuberculosis occurred only 9 times, ulcerative colitis 7 times, polyposis only 3 times, sarcoma only once, and diverticulitis requiring surgery 12 times. Some of these lesions occurred more frequently in the examining room, of course, not being amenable to or requiring surgery. Diverticulosis and diverticulitis are much more frequently found, being seen in some degree in 15 or 20 per cent of all cases subjected to colon examination at our hands. The filling defect resulting from carcinoma is flat, annular, polypoid or obstructing, sometimes attended and modified by spasm, but usually characterized by irregular serration of the lumen at the site of the lesion, constancy of the finding and coincident palpation of an induration at the site of the defect; whereas with diverticulitis the filling defect is fusiform, always annular, much less irregular in its serration, usually massive without crater formation, with some preservation of mucosal pattern, and with patient observation, sometimes extended over twenty-four hours, it will be possible to discern a few or many of the characteristic small, bud-like, rounded shadows representing opaque material in the lumen of the diverticula.

The identification of polyps in colonic roentgenograms is not always a simple matter. The numerous small rounded defects in the colonic shadow, often seen after expulsion of the opaque enema and the introduction of air, are said to be pathognomonic of generalized polyposis, but it is possible to observe this same appearance due to the presence of numerous small air-bubbles. Rounded masses of inspissated non-opaque fecal matter retained in the colon in spite of efforts at cleansing may closely simulate polyps. Because of this possibility it should be a rule to insist upon a duplication of the examination whenever the findings of the first study indicate a probability of multiple polypoid growths. In fact, it is a good practice to duplicate the findings at a second study in every case in which serious surgical procedures depend upon the decision of the radiologist. I have in mind the case of a gentleman with certain symptoms suggesting the presence of a colonic carcinoma. The ordinary enema study with opaque media showed an apparent ring carcinoma at the middle of the sigmoid loop; at operation no abnormality was found in the colon, even after a colotomy was performed. In retrospect, it was felt that in case of a napkin-ring carcinoma there should

have been a marked dilation of the colon proximal to the apparent constriction, and in any event, the findings should have been duplicated at a second x-ray study.

In the endeavor to advance the stage at which a positive diagnosis can be made radiologically in the early lesions, the radiologist is tempted to view with suspicion every possible variation of the colonic contour from that ordinarily observed. This is as it should be, but it introduces into the problem numerous sources of error which may lead to a mistaken positive opinion when no organic lesion really exists. Like a sentry on outpost duty at night, he must be on guard against seeing things which do not exist. The vicinity of the rectosigmoid and the terminal few inches of the sigmoid are especially difficult to visualize and interpret, and much responsibility falls upon the radiologist when he is called upon to find or exclude an organic lesion, especially an early malignant lesion, in this area. It should never be lost sight of that all lesions in this segment of the colon must be considered malignant until they are demonstrated to be innocent.

It is not always possible on the first examination satisfactorily to visualize this part of the colon by any technic thus far devised; repeated examinations are often a requisite. We have had cases where three or four attempts were necessary before the right conditions prevailed to make a negative or positive opinion justifiable. The amount of residual opaque enema left behind after attempt at evacuation may be so dense as to hide the early lesion; filled loops of small intestine may overlie the rectosigmoid region; too much air may have been injected; the quality of the films may be unfavorable; the exact proper angle of obliquity to demonstrate the lesion may not be possible in a given instance. In many cases the positive diagnosis of an early lesion in this vicinity is in our opinion not justifiable without duplication of the findings. If the lesion is so early as to give roentgenological data of dubious character, the delay of a fortnight or a month is not likely to be disadvantageous, and another examination at this interval ought to clear up the question. We have been led to do so because we have seen cases where a second examination seemed to verify a diagnosis of polyp; yet at surgery most careful search, sometimes aided by search with a proctoscope introduced through a colotomy, failed to show the polypi. The most intense application to superior technical detail and correlation of radiographic effort with the proper manipulation of the patient will bear fruit in better diagnostic results.

SUMMARY

In spite of the handicaps the roentgenological study when properly carried out should permit a correct diagnosis of more than 90 per cent of demonstrated cases of carcinoma of the colon. Improvement on this percentage may be gained but it must be at the expense of greatly magnifying the intricacies and inconveniences of the technical procedures. The radiologist should welcome the opportunity to improve this percentage. The study with the x-rays is not a simple procedure and it is not routine. There must be specialization of effort, and preliminary knowledge of the probability of the disease and perhaps of its location. Each case must be individualized. Although screen study cannot be omitted, particularly as a means of "aiming" the roentgenographic exposures, the preponderance of evidence will be presented by the roentgenograms which should be obtained in profusion with the greatest of painstaking and persistence in attention to technical details. Such devotion of time and material is warranted only when the radiologist is fully acquainted with the other clinical evidences on which the suspicion of carcinoma is based, so that he may function truly as a consultant in diagnosis.

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"As far as I am concerned I intend to devote the rest of my life to the problem of developing man in his organic and spiritual entirety. For the quality of life is more important than life itself. We must now use theoretical and applied science not for the satisfaction of curiosity but for the betterment of the self and for the construction of the truly civilized man."—Dr. Alexis Carrell.

The final eradication of tuberculosis is dependent on the eradication of the foci from which it is spread, and the family of the patient with tuberculosis must be carefully studied. *J. G. Bohrfoush, M. D. and Pauline Michael, Amer. Rev. of Tuber., Oct. 1940.*

ROENTGENOGRAPHIC CONSIDERATIONS OF SOME ASPECTS OF CHRONIC MASTOIDITIS WITH SPECIAL REFERENCE TO CHOLESTEATOMA

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Roentgenographic examination of the mastoid processes has become a routine, if not an indispensable, procedure in the management of all types of disease of the ear wherein extension and involvement of the mastoid process is possible.

Disease of the mastoid process may be divided into two major groups, namely, acute and chronic. Each group offers a separate clinical and roentgenological problem. Certain changes in chronic infection of the mastoid process may be detected with accuracy only by roentgenographic examination and I wish to discuss some of these changes in the following.

During the years 1934 to 1941 at the Illinois Eye and Ear Infirmary there has been a gradual decrease in the number of acute mastoid cases examined roentgenographically with a comparative increase in chronic ones.

	1936	1937	1938	1939	1940	Totals
Cases examined	259	250	355	561	573	1958
Normal		41	9	57	13	120—6%
Acute	96 38%	95 38%	78 22%	107 19%	106 18%	482—24%
Chronic	163 62%	114 46%	228 75%	397 69%	454 80%	1356—69%

Whether this change is due to the efficacy of Chemotherapy or not (many believe this to be true)[1] I am not prepared to state, but such an alteration makes roentgenographic diagnosis of chronic mastoiditis increasingly important.

One may ask, "What is chronic mastoiditis?" On reviewing the literature on mastoiditis a hard and fast dividing line cannot be drawn between acute and chronic conditions but from a roentgenological standpoint I believe the following criteria will designate a chronic condition:

"Intermittent or persistent symptoms and or clinical findings referable to the mastoid process following an acute otitis media infection when supported by demonstrable abnormal change on x-ray study. The time after the original acute infection may vary from a few weeks to years."

When an infection involving the mastoid process becomes chronic, demonstrable evidence of this infection, its advance and effect, depend entirely on the process of destruction and repair therefore the major roentgenographic criteria are:

1.—Alteration of growth (in the young).[2]

2.—Thickening of the lining membrane of cells remaining intact.[3]

3.—Evidence of repair by calcification.

4.—Focal loss of bone substance.

In the following I wish to present some phases of roentgenographic evidence in chronic mastoiditis.

Sclerosis and the undeveloped mastoid: Sclerosis is defined as induration or hardening of chronic inflammatory origin.

Some writers, notably Wittmack and Schillinger,[6] have taken exception to applying the term sclerosis to changes in the mastoid process, maintaining that in most instances described as sclerosis the condition actually present is one of partial or complete failure of pneumatization of the mastoid process. It is stated however that inflammation of the mastoid, early in life, may prevent the usual process of pneumatization.

What are the usual sequence of events and changes in the mastoid process accompanying infection of this structure? In an otitis media with obstruction of the Eustachian tube the air contained in mastoid cells is slowly absorbed without exchange or replacement.[4] If the middle ear infection extends into the mastoid antrum thence involving the mastoid process the infection involves primarily the membrane lining of the mastoid cells. The infected or inflamed membrane responds by swelling or edema and subsequently, if the pathologic process is severe enough, by exudate. The exudate may drain through the mastoid antrum if the paths of drainage are adequate, but if not, the pressure of the exudate within the cells increases to the point where decalcification of the cell walls takes place (pressure necrosis and osteitis) and subsequently the cell walls break down in varying degrees and extent.[5] The extremes of this process are the acute destructive mastoiditides in

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which surgical intervention is indicated. However, should the inflammatory process subside, before bone destruction sufficient to necessitate surgical intervention occurs, repair of the damage due to the inflammation or infection will occur to the extent of that damage. This change varies from simple fibrotic thickening of the membrane lining the mastoid cells to recalcification of partially destroyed bony trabeculae forming cell walls. Repeated infections of the mastoid cells in the presence of repeated or continuous otitis media of lower grades may conceivably produce simultaneous changes of both active inflammation and repair.

Demonstration of these changes on roentgenographic examination is entirely possible and the appearance of the reparative change depends to a great extent on the size of the individual cell which was involved and the degree of development and extent of the mastoid process in general.

Given a roentgenographic examination of mastoids where there is a dissimilarity and assymetry in the two sides the question which always arises is, "Is the difference in structural appearance due to post inflammatory change or is it due to developmental variation, or is it a combination of the two?"

During observation of something over 2000 cases I have found the following roentgenographic signs or evidence of most value in differentiating these changes.

Post inflammatory changes:

1.—General hard density throughout area of mastoid process involved with no architectural arrangement.

2.—The density is greater than surrounding and usually normal diploic bone structure.

3.—The anterior wall of the sigmoid sinus is usually roughened.

4.—There is frequently a history of past middle ear infections.

Developmental variation:

1.—There is always identifiable trabecular structure, even in the compact or diploic structure closely resembling usual skull bone architecture.

2.—The density may be variable but is identifiable with ossification and cellular variation.

3.—The anterior wall of the sigmoid sinus is usually smoothe, well demarcated and forelying.

4.—The antra on base film appear unusually large for the general size of the mastoid (Chamberlain-Towne position).

5.—There is no history of past middle ear infections.

Inflammatory change in a poorly or undeveloped mastoid:

1.—History of recent otitis media is very important.

2.—Small punctate areas of very hard density surrounded by areas of relative lucency are usually observed in the antral region of the lateral film (osteomyelitis).

3.—The bone structure about the antrum on the base film is of softer appearance than that at more peripheral points.

The undeveloped mastoid may be given more than passing consideration because of the danger of early intra-cranial complications due to little or no lining membrane of cells to combat infection and the tendency of an osteomyelitis to be progressive. This fact has been given attention by Schillinger[6] and others[7, 8] who describe the changes as those of osteomyelitis in diploic bone or the undeveloped mastoid and osteitis in cellular structure, (such as present in the early bone involvement in infection of the paranasal sinus).

When a recent or acute infection of a mastoid has occurred in an individual who has suffered a non surgical mastoiditis in the past, roentgenographic evidence of repair of old damage is always present with density variations indicating recent involvement.

Criteria:

1.—Repair of old inflammatory change.
   a.—Thickening of cell walls — hard and smooth
   b.—Recalcification of bone loss
      1.—Very dense and irregular
      2.—No architectural arrangement
   c.—History of recent otitis media with recent pain

2.—Recent inflammatory change.
   a.—History of recent otitis media with recent pain
   b.—Soft appearing cell trabeculae (mucosal edema)

c.—Decalcifying bone structure

d.—Foci of soft appearing, less calcium containing bone substance in comparison to surrounding.

Chronic abscess formation: In 1934 Tremble[13] offered a classification of cell groups in the mastoid process, nine in number, covering practically all of the minor anatomic points.

In the practical application of describing these minor cell groups, the writers have encountered some difficulty in over-lapping of areas. To obviate this difficulty an investigation was made to attempt to simplify the regional cell groups, and four major groups were finally decided upon as the most practical in describing localized areas of pathologic change. They are:

1.—Posterior zygomatic group

2.—Squamous group (temporal)

3.—Sinus knee group

4.—Sino-tip group

All of these groups of cells are considered as subsequently entering the region of the periantral triangle and connecting with the mastoid antrum.

Many cases of localized bone destruction in the above mentioned groups of cells, where surrounding groups of cells show considerably less evidence of pathologic change, may raise the question, "Do these groups of cells aerate separately by continuous outgrowth from the mastoid antrum due to each having an individual path of pneumatization?"

Every roentgenologist examining any number of mastoid processes is impressed from time to time with the fact that large foci of bone destruction may occur in a mastoid process while the surrounding cells are comparatively normal in appearance or at least intact.

In any given chronic mastoid infection the possibility of a localized area of bone destruction consistent with an abscess formation may occur, and it is usually the roentgenogram which first has an opportunity to bring attention to such a formation.

There is one finding in chronic abscess formation which has been common to all observed at the Illinois Eye and Ear Infirmary during the past five years, namely:

An area of decreased density within the usual mastoid region, not directly extending into the antrum, and completely surrounded by an identifiable margin of intact bone substance. (The identification of the mastoid antrum extension must be made in differentiation of cholesteatoma to be discussed later).

In such abscess formation, infection by the mucosus capsulatus organism may be suspected by:

1.—Prolonged insidious history and obscure findings.

2.—An area of abscess formation having surrounding bone margins which are not as dense and well defined as in other pyogenic abscesses.

3.—A tendency for "tunnelling" or tracts of destruction leading from the larger area into the surrounding mastoid structure and toward the mastoid antrum.[9]

A large single abscess is frequently more difficult to diagnose than several smaller areas of necrosis because of the general contours of anatomic structures bounding the mastoid process.

The following shadows have been found confusing:

1.—Portions of an over-lying pinna.

2.—Irregular bone development.

3.—Anatomic dehiscence of bone.

Cholesteatoma: With progress in x-ray study and diagnosis it has become possible in many instances to identify an aural cholesteatoma by x-ray evidence, long before its presence is suspected or known clinically.

Pathology: Aural cholesteatoma may be of two types,[10] primary and secondary. The primary type, probably pathologically an epidermoid tumor,[11] is exceedingly rare and has not been observed by the writers.

The secondary type of cholesteatoma is, however, of rather frequent occurrence reported by MacMillan[10] in a series of cases to be present in as high as 68% of chronic mastoid cases examined.

Grossly, the mass is described as a laminated, pearly gray one extending into the bone structure about the mastoid antrum from which it has its origin.

Microscopically, it is covered by a capsule of

epithelial origin and contains much purulent and cellular debris in which cholesterin crystals may be identified.

The pathogenesis of cholesteatoma is somewhat a moot question, there being three major theories concerning its development.[10, 12]

1.—Perforation of tympanic membrane and invasion of epithelial cells from this site.

2.—Transition of cells due to irritation in middle ear.

3.—Metaplasia of cells in region of middle ear and mastoid antrum.

However it is generally agreed the first formation occurs in the mastoid antrum and extension takes place from this point. This fact is of great diagnostic importance.

Extension is usually by erosion of adjacent bone structure due to general progressive enlargement, but some reports have shown actual invasion of Haversian structure in the bone by the growth.

The close proximity to the mastoid antrum of structures such as the labyrinth, the tegmen, the posterior canal wall carrying the facial nerve and the anterior wall of the sigmoid sinus makes early detection of this change important.

Symptomatology: Subjective symptoms directly referable to the presence of cholesteatoma may vary considerably. However the most constant symptoms which have been noted by the authors are chronic otorrhea with odor which has been resistant to local treatment and a subjective sense of fullness in the mastoid involved. Objective study often reveals polypoid formations visible in the depths of the external auditory canal or unusual collections of debris. Associated symptoms not infrequently depend upon the structures receiving the maximum pressure from extension of the cholesteatoma. The symptoms of dizziness in an individual with a chronic otorrhea always warrants close study to detect extension of a cholesteatoma toward the labyrinth. The "silent cholesteatoma," the one which may suddenly endanger the life of an individual by its erosions and extensions permitting infection easier access to more vital structures, is the one most likely to be suspected by careful roentgenographic examination in all cases of resistent otorrhea.

Roentgenographic evidence of cholesteatoma:

Classical: The presence of cholesteatoma in a mastoid process has been described as a circumscribed area of loss of bone substance extending from the mastoid antrum, having margins which are sclerotic, more so than may possibly be present in the surrounding bone substance. This change is observed in the lateral, or a modification of the Law position.

When present the above evidence is rather conclusive and positively diagnostic.

Any roentgenologist, however, studying many mastoids has been surprised when a surgeon reports to him of finding a cholesteatoma upon operative intervention in a mastoid process in which previous x-ray study (in Law position only) had not revealed change even suggesting the presence of such a pathologic process.

Obscure evidence of cholesteatoma in the routine lateral (Law) position: In 1935 one of the writers (JHG) made a review of several roentgenographic studies of mastoids examined in the Law position only, where cholesteatoma had been found at operation but not suspected on the original interpretation.

An attempt to find some sign or evidence common to all was made, without success, but in five out of nine cases reviewed the following change was common. Directly above the shadow of the external auditory meatus there appeared a small roughly triangular area of demarcated lesser density present only on the involved side, but variable in size. This change was noted and subsequently watched for and, it has proved a valuable diagnostic sign for the presence of cholesteatoma when present, in the "Law" projection.

The use of a third position: In 1936 MacMillan[10] discussed the detection of cholesteatoma by the use of a basal projection, a modification of the Chamberlain-Towne position, wherein more adequate presentation of the mastoid antrum was obtained for actual measurement and comparison.

An average normal size for the mastoid antrum was given as 6 by 10 millimeters. Considering the pathology of cholesteatoma it may be reasonably concluded that abnormal well demarcated enlargement of the mastoid antrum

primarily indicates the presence of a cholesteatoma.

In the latter part of 1936 the third position was adopted as a routine procedure at the Illinois Eye and Ear Infirmary in all cases of chronic mastoiditis, and including January 1, 1941 a few more than 1400 cases of chronic ear disease have been so examined.

In the course of this study the observation regarding the size of the mastoid antrum made by MacMillan, i.e. 6 x 10 millimeters for the average normal observed in the so called Chamberlain-Towne position, has proven quite reliable in spite of the fact no precision technic was used.

In many cases, an enlarged antrum has prompted consideration of cholesteatoma which have not been operated upon but in only a few instances has cholesteatoma been suspected and not found at operation. Those cases in which cholesteatoma has not been found have always had an enlarged antrum.

In this group of cases conditions entering into the differential diagnosis have been as follows:

1.—Large antra which may have contained a cholesteatoma but spontaneously evacuated.

An enlarged antrum in the presence of a history of chronic ear disease when sharply demarcated must always be considered a cholesteatoma but in some instances a cholesteatoma is not found at operation. These cases must be considered spontaneously evacuated cholesteatoma into the middle ear and external canal and so far a differentiation of the presence of an active tumor has not been possible.

2.—Comparatively larger antra in undeveloped mastoids.

Structure of the mastoid is of primary importance as in the less well developed mastoids the antra appear larger but by actual measurement will be found within average normal limits and the sclerosed margin is absent.

3.—Antra enlarged by low grade inflammatory change.

The antrum enlarged by inflammatory change has been observed to be poorly defined, and the surrounding bone structure is soft in appearance compared to more distant, uninvolved bone substance.

4.—Overlying emissary vein.

An overlying large emissary may be traced above the margin of the petrous bone.

5.—Neoplasms.

Neoplasms other than cholesteatoma involving the mastoid process in this study have not centered in or about the mastoid antrum, and the margins of the involved bone substance have been irregular and follow no general contour.

6.—Hemangioma.

This condition has not been knowingly encountered in the group of cases studied for this paper.

To summarize:

1.—Roentgenographic study of chronic mastoiditis is becoming increasingly important.

2.—Structural and pathologic evidence together with clinical findings must be evaluated in differentiating poor mastoid development from post inflammatory change.

3.—Inflammation in a poorly developed mastoid is most apt to give x-ray evidence of osteomyelitis.

4.—Abscess formation in a mastoid process may be diagnosed by x-ray study.

5.—A third position in routine roentgenographic study of a chronic ear disease will greatly increase the roentgenologist's diagnostic accuracy relative to cholesteatoma.

BIBLIOGRAPHY

1. Pancoast, Pendergrass & Schaeffer; "The Head & Neck in Roentgen Diagnosis" pp. 491
2. Wittmack, K. — Zentralbl, f. Ohrenh **17**: 19-27, 1920
3. H. M. Berg, G. M. Constans — Am. J. Roent. July 1934 pp 452-457
4. See 1 — pp 467-483
5. Mayer, O. — Ztschr. f. Hals-Nasen — u. ohrenh — **18**: 628-651, 1927-'28
6. Schillinger, R. — Arch. Otolaryng. **25**: 1937 pp 455-464
7. Eagleton, W. P. — Ann. Otol., Rhin & Laryng. **44**: 1113-1128, 1935
8. Kopetsky, S. J. — Ann. Otol., Rhin & Laryng. **44**: 1003-1011, 1935
9. See 1 — Richter H.
10. A. S. MacMillan — Am. J. Roent. **36**: 747-750, 1936
11. Friedman, M. C. & Quittner, S. S. — Archives Otolaryng. 1938 — pp 209-212
12. Holmes, E. M. — Ann. Otol., Rhin & Laryng. **48**: 135 — 43, 1938
13. Tremble, G. E. — Arch. Otolaryng. **19**: 172-182

DISCUSSION

Dr. Fred H. Decker, Peoria: Doctors Gilmore and Urban have been in a very fortunate position to make a study of this kind. Personally, I admire anybody who is willing to study the temporal bone as

much as these men have, because to me it has always been a kind of bugbear; in fact, as you remember, Pendergrass, and Pancoast and his group, in a recent book made a statement that there is no phase of radiology that has been more neglected than that of the temporal bone.

So I think that the chief value that we should get from this paper today is the fact that they have reported an extensive series and have shown very nicely the many changes than can occur in and about the mastoid. In many ways that helps us out in classification.

We might not all agree with the method that they use. It is a lot simpler to call them, for instance, a child type, or an adult type. I don't think that covers the ground, and I think one is a lot better off to describe the mastoid development as deploic or pneumatic, or sclerotic.

Another phase of their paper was interesting to me, and that was the high frequency of the cholesteatoma. In our own series they have been very few, and it probably should be a spur to us to look a little closer for them, although during the past year we ourselves have used the view that they described as the Chamberlain-Towne position but that we have called the fronto-occipital view, as described by McMillan. It seems to be a very effective one and, to my notion, adds considerably more to the mastoid study than simply the presence or absence of cholesteatoma.

I would certainly heartily commend the authors for their paper.

SOME PROBLEMS OF BILIARY TRACT SURGERY

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The morbidity and mortality of many operative procedures have been reduced, as we have come to understand more clearly the deviations from normal physiological function which disease of certain organs brings about, and as we have also come to understand the processes by which normal, or more nearly normal, function may be re-established prior to anesthesia and operation.

This has been true in operations for hyperthyroidism, intestinal obstruction and prostatic hypertrophy where greater emphasis on preoperative and post-operative care has led to a substantial reduction in mortality during the past decade or two. It is equally true of many surgical lesions of the biliary tract, for the past decade has provided a much clearer picture of normal physiological function of this system and a more comprehensive picture of the abnormalities of function which may occur as the result of disease. I should like to discuss with you today a few of the problems presented by patients with gallstone disease, to present our methods of meeting them and then to leave it to you to determine whether greater attention to these factors may not provide a means of further lowering the morbidity and mortality of operations for the relief of gallstone disease and its complications.

One of the most serious problems in this field is the frequent inability to determine the extent of hepatic injury. The liver function tests have enjoyed a variable degree of approval by different investigators and by the same investigators at different times. The surgeon is interested in whether or not the liver is so seriously impaired that operation is attended by grave hazard. I doubt whether any one of the commonly used tests can, as a rule, give us more information than can be obtained from a good history and careful physical examination. The galactose tolerance test, hippuric acid conjugation, prothrombin determination, bromsulfalein retention, the ratio of free and combined cholesterol and other tests now commonly used each measure but a single function, and a marked deviation from the normal in one test does not necessarily mean that the others will be equally impaired. In fact, in our experience the reverse is often true. Some general idea of the degree of impairment of function may be had from the results obtained from a number of different tests. However, we have not always been able to find close correlation between the histologic picture and the results of function tests, and on more than one occasion we have seen a liver which gave every indication of normal function prior to anesthesia and operation become incompetent following operation. If morbidity and mortality are to be kept low, the surgeon must not be lulled into a sense of false security, and too often dependence upon function tests has tended to do this.

A considerable number of the patients with

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gallstone disease have diabetes mellitus. It is our impression that this relationship is increasing rather than decreasing. It is important to remember that the diabetes often is not diagnosed until the patient is admitted to a hospital, and it is equally important to remember that the liver stores of glycogen may be seriously reduced in these patients because of long standing hepatitis. Since the hepatic glycogen is the sole direct source of the blood sugar, a marked decrease in the glycogen stores of the liver may create a real hazard. A dose of insulin, which in the non-biliary tract diabetic patient would have but slight effect on the blood sugar concentration, may have a very profound effect in the patient whose liver cannot rapidly mobilize glucose from the diminished hepatic glycogen stores to replenish the falling blood sugar concentration brought about by the insulin action.

There is no need rapidly to control the hyperglycemia in these patients, especially if they are above fifty years of age. The precipitation of insulin shock in the elderly diabetic patient, not previously treated with insulin, may be irreversible even though large amounts of glucose are subsequently given. It is far better slowly to prepare such patients, unless diabetic acidosis is also present when of course the therapy must be more active. These patients, as a group, require the care of someone familiar with diabetes on the one hand and the pathologic physiology of hepatic dysfunction on the other.

It is now 33 years since Babcock[1], of Chicago, called attention to the frequent relationship of gallstone and cardiac disease. For many years it was believed that organisms which had a specific affinity for the gall bladder also attacked the myocardial muscle. Schwartz and Herman[2] believed that the cardiac disturbance was the result of fatty infiltration of the heart and that this was merely an expression of the disturbance of metabolism from which many gall bladder patients suffered.

Fitz-Hugh and Wolferth[3] more recently reported certain changes in the electrocardiogram which many of these patients presented. There is often a depression and occasional inversion of the T wave and at times a slurring of the QRS interval. Weiss and Hamilton[4] have confirmed the T wave changes and have substantiated the conclusions of Fitz-Hugh and Wolferth that the electrocardiographic changes disappear very soon after convalescence from adequate biliary tract surgery. It is their opinion that the changes are the result of toxic disturbances in the cardiac mechanism. Every change in the electrocardiogram in these patients does not necessarily indicate serious and irreversible cardiac damage.

Many patients with gallstone disease also have pain which simulates angina pectoris. Very often the patient is denied relief from the symptoms of gallstone disease because an internist believes the risk of operation is too great. We have had the good fortune to see a number of these patients, and careful study of them often reveals the fact that the pain is rarely due to true angina pectoris. Royster and Sanders[5] have demonstrated in one of them, for the first time I believe, that reflexes arising in the common duct may give rise to pain and other sequellae which are at times nearly indistinguishable from angina pectoris.

The pain is often typically substernal and precordial and may be referred to the left upper extremity. It is frequently preceded by a feeling of impending death, and is followed by hyperesthesia and hyperalgesia of the area to which pain was previously referred. It differs from true angina pectoris in that the attacks are not related to effort, for they usually occur at night while resting in bed. The attacks may have been present over a period of years, yet the electrocardiagraphic changes may be negligible. Even with these differences, on more than one occasion we have seen competent cardiologists who were loathe definitely to state that the patient did not have angina pectoris. One of the patients upon whom we operated this year had been studied by a cardiologist in this part of the country who wrote to her family physician: "God save Mrs. ..... from the hands of the surgeon."

Patients with gallstone disease at times do have true angina pectoris and serious cardiac disease, just as do non-gallstone patients, but all precordial pain, or even changes in the electrocardiogram, do not necessarily indicate serious cardiac disease. When heart disease is present its symptoms may be accentuated by the coexisting gallstone disease, the latter frequently giving rise to recurrent distention, to constipa-

tion and to disturbed sleep by nocturnal attacks of pain and indigestion. Even patients with serious heart disease, as a rule, withstand operation well, if they are properly prepared before operation, and the risk involved in the other patients is no greater than if the pseudo-angina had not existed.

A decade ago the most serious complication of operation on a patient with common duct obstruction was post-operative hemorrhage. Until Armand Quick[6] demonstrated a prothrombin deficiency in these patients the pathologic physiology of this hemorrhagic tendency was not known. In 1934 Dam[7], of Copenhagen, and Almquist[8], of this country, found that the hemorrhagic disease of the gizzards of young chicks was due to a deficiency in the diet of an accessory foodstuff which Dam named vitamin K.

Dam[9] later showed that these chicks had a prothrombin deficiency and that the response to vitamin K therapy was a return to normal of the prothrombin concentration. It was soon determined that vitamin K was fat soluble and that the prothrombin deficiency which took place in man might well be conditioned by the absence of bile salt from the intestine resulting in the failure of absorption of vitamin K. Before Quick[10] had an opportunity to test this hypothesis, Smith, Warner and Brinkhous[11] found it to be true.

It is now possible to prepare the jaundiced patient with bile salts and substances containing naturally occurring vitamin K_1 or K_2, or to use one of a variety of synthetic substitutes before operation. Approximately 80 per cent of the patients so prepared for several days prior to operation will respond favorably, but from 18 to 20 per cent have such severe liver injury that even though large amounts of bile salts and the most active preparations of K are administered, the prothrombin concentration does not respond satisfactorily and often does not respond at all. When this occurs, fresh blood or plasma should be used to control the tendency to hemorrhage. If operation can be delayed, diet may be used for some days in an effort to improve hepatic function. We have done this on several occasions with favorable results.

One of the most serious complications of operation on the patient with longstanding gallstone disease, with or without involvement of the common duct, is the degeneration or necrosis which may follow the use of hepatoxic anesthetics. Ether, contrary to general opinion, may cause serious hepatic degeneration and even necrosis of the liver. Nitrous oxide may, under certain conditions of anoxia, lead to such serious injury that the histologic picture is nearly indistinguishable from the necrosis induced by chloroform. Even ethylene has been shown to effect the hepatic function, and no one has satisfactorily demonstrated that cyclopropane is entirely harmless.

Many of the severe reactions which biliary tract patients at times have following operation are without doubt due to varying degrees of degeneration and necrosis conditioned by the anesthetic agent and the method of its administration. These reactions are often called minor degrees of "liver shock." We are convinced that spinal anesthesia with procaine, in which major depressions of the blood pressure are prevented by the preliminary use of long acting vasoconstrictor drugs, is at present the safest anesthetic for these patients. Even with this method of anesthesia the patient should be prepared so as to minimize hepatic injury. Rarely indeed is operation an emergency.

For years we have been led to believe that a high concentration of hepatic glycogen would protect the liver from injury by hepatotoxic anesthetics. At first we fed patients a high carbohydrate diet, and then as the result of debatable reasoning, we gave these patients glucose intravenously for several days prior to operation. Many of us then sat back smugly confident that we had done our best. Some of us were even guilty of stating, as Banks and Sears[12] have recently done, that hepatic regeneration would take place more rapidly following injury upon a carbohydrate diet than upon any other. It is high time that we critically review the evidence upon which these assumptions are based. I would not for a moment deny that the program we have been using has helped; but has it done the best that we are capable of? In the first place, 3000 c.c. of a 5 per cent solution of glucose a day provides the patient with but 600 calories. If no food is given by mouth is it possible that glycogen can be maintained in the liver for any

time? Can we materially affect the composition of the liver unless we supply the patient with a sufficient amount of food to meet energy requirements plus an additional amount for storage? The glucose so given will to a degree prevent the breakdown of body tissues to supply energy requirements, but that is all. The loss of weight of our patients during pre- and post-operative care is usually an expression of the extent to which we fail to meet their energy requirements. Of this there can be no doubt.

Evidence which we have obtained[13] and which has since been confirmed and extended by several observers[14, 15], points to the fact that protein and not carbohydrate directly protects the liver from injury by a variety of hepatotoxic agents. I can summarize our work by stating that a liver with a high lipid content and a low protein content is maximally susceptible to injury by these agents. This explains why the liver of undernutrition or starvation is so susceptible to damage. Conversely, the liver with a low content of fat and a large amount of available protein is maximally protected against injury. Even in the presence of considerable amounts of lipid, an adequate intake of a suitable protein for some time prior to anesthesia and operation will provide protection from such an injurious agent as chloroform.

We have known that the livers of patients with long standing biliary tract disease frequently contain large amounts of fat. One objective of pre-operative therapy must be to rid the liver of as much of this fat as possible. This can, in part, be achieved by the deposition of glycogen, for usually as glycogen is deposited in the liver fat is displaced from it. This process is known as the fulfillment of the Rosenfeld[16] hypothesis. Data which we have obtained demonstrate clearly that protein will do this much more rapidly than carbohydrate, for the addition of protein to the extent of 28 per cent of the total calories of an otherwise high carbohydrate diet will, in seven days, result in a decrease in the liver lipid concentration in the presence of ductal obstruction similar to that obtained on high carbohydrate-low protein diet in fourteen days.[17] Protein, therefore, is useful from two points of view, its direct protective capacity, which is probably due to certain components of the protein molecule, and to its capacity to rid the liver of excess fat.[18]

We are using in our patients, a diet in which the total calories consist essentially of 70-75 per cent of carbohydrate, 20-25 per cent of protein and not more than 5 per cent of fat. It is, we believe, the ideal pre-operative diet for these patients. It can be fed by tube if the patient will not eat. The carbohydrate in large part comes from the banana and the protein from Casec or cottage cheese or a protein digest such as Aminoids. The patients receive from 2500 to 4500 calories daily for from five to twenty-one days before operation. Biopsies from the liver of these patients operated on under spinal anesthesia demonstrate that we can by this method condition a liver to minimal injury.

If oral or tube feeding is impossible, then glucose and plasma can be given intravenously. The addition of plasma will provide a better hepatic composition than can be obtained from glucose alone, but even this combination will not provide as satisfactory a condition as can be obtained by oral or tube feeding. If sufficient food is not ingested by mouth, intravenous therapy should be used as an adjunct.

There are certain problems concerned with the operation which must be kept in mind. Injury to the ductal system can often be repaired but injury to the hepatic artery requiring ligation will inevitably lead to hyperthermia, a falling blood pressure, a rapid thready pulse, hypoglycemia and death. This is commonly known as "liver shock." While life is compatible with a very slow occlusion of the hepatic artery, its acute occlusion is invariably associated with death. The greatest care must, therefore, be exercised in dissections of the right free border of the gastro-hepatic omentum.

The decision of when to open the common duct is often difficult to make. It should always be opened if the patient is jaundiced at the time of operation, or if there is a history of previous jaundice. It should be opened if it is greatly dilated or if the cystic duct is short and large and the gallstones small. Finally, it should be opened if, after all considerations, any doubt as to the advisability of this additional procedure still persists. The time to open the duct is at the first operation.

When common duct drainage has been established, it is the height of folly to permit large amounts of bile to drain into a bottle at the side of the bed. No amount of glucose and salt given intravenously can compensate for the diversion of bile from the intestinal tract. Even though the bile may have a low bile salt content, it will help to bring intestinal function back to normal and the asthenic states so frequently observed during periods of excessive bile diversion rarely will be encountered if excessive bile loss is not permitted. Bile is not solely an excretory product; it plays an important part in the intestine in the activation of lipases, the emulsification and absorption of fats, and the absorption of the fat soluble vitamins such as vitamin K. We must constantly attempt to restore normal function rather than inhibit it.

Diet is just as, or even more important after operation as before it, for it is then that regeneration can most readily take place. We do not yet know what the ideal postoperative diet is, but it can be accepted without controversy that cellular regeneration cannot take place rapidly on a diet inadequate in protein. The major question at present is what protein will best facilitate repair. Data which workers in our laboratory are now obtaining strongly suggest that when liver repair is desired liver protein is the best substance to provide this.

Vitamin K therapy should be continued until wound healing is nearly complete. The fact that the prothrombin concentration was normal prior to operation should never be accepted as evidence that it will remain so after operation. It has been our experience that it usually falls, even when the physical trauma to the liver has been minimal. Occasionally a liver that responded well to vitamin K therapy prior to operation will fail just as completely to respond following operation. Such a liver has been seriously injured, and it may be necessary to resort to blood or plasma transfusions to prevent or control hemorrhage.

The common duct tube should never be removed until a cholangiogram has been made. Our complacency is disturbed from time to time by a graphic visualization of a stone we have failed to remove. It is best to discover this when it is still possible to attempt the solution of the stone through the tube which leads to it.

These are a few of the problems which we are daily meeting. Their control is often not difficult. There are, of course, many others such as those presented by acute infection and cystic duct obstruction, by stricture, acute cholangitis and malignancy which I have not had the time to review with you. Certain of the principles I have attempted to cover apply, however, equally well to these conditions.

Applying these principles in our own clinic has led to a very substantial reduction in mortality. From 1922 to 1929 the mortality of operations for common duct obstruction was 22 per cent, from 1935 to 1938 11 per cent, and from 1938 to 1941 it was but 2.6 per cent. There have now been operated on, on my service, a consecutive group of 629 non-jaundiced patients subjected to cholecystectomy with or without common duct drainage with but a single death. This mortality is not due to great operative experience, for a very considerable number of these patients were operated on by my surgical fellows. It is, in the main, the result of having obtained a better picture of the pathologic physiology of biliary tract disease and of attempting to restore more nearly normal function prior to operation and to maintain and improve this subsequent to operation.

BIBLIOGRAPHY

1. Babcock, R. H., J. Am. Med. Assoc., 1909, **52**: 1904
2. Schwartz, M. and Herman, A., Ann. Int. Med., 1931, **4**: 783
3. Fitz-Hugh, T. Jr., and Wolferth, C. C. Ann. Surg., 1935, **101**: 478
4. Weiss, M. M. and Hamilton, J. L., Surg., 1939, **6**: 893
5. Royster, H. P. and Sanders, G. B. personal communication
6. Quick, A. J., J. Biol. Chem., 1935, **109**: LXXIII
7. Dam, H., Nature (London), 1934, **133**: 909
8. Almquist, H. J. and Stokstad, E. L. R., J. Nutrit., 1936, **12**: 329
9. Dam, H., Schoenheyder, F. and Lewis, L. Biochem. J., 1937, **31**: 22
10. Quick, A. J. J. Am. Med. Assoc., 1937, **109**: 66
11. Warner, E. D., Brinkhous, K. M. and Smith, H. P., Proc. Soc. Exper. Biol. and Med., 1937-38, **37**: 628
12. Banks, B. M. and Sears, J. B., Am. J. Dig. Dis., 1939, **6**: 83
13. Goldschmidt, S., Vars, H. M. and Ravdin, I. S., J. Clin. Invest., 1939, **18**: 277
14. Miller, L. L. and Whipple, G. H., Am. J. Med. Sci., 1940, **199**: 204
15. Messinger, W. J. and Hawkins, W. B., Am. J. Med. Sci., 1940, **199**: 216
16. Rosenfeld, G. Ergebn. d. Physiol, 1903, **2**: 50
17. Johnson, J., Ravdin, I. S., Vars, H. M., and Zintel, H. A. Arch. Surg., 1940, **40**: 1104
18. Ravdin, I. S., Surgery, 1940, **8**: 204

RIGHT OF A COUNTY MEDICAL SOCIETY TO DISCIPLINE MEMBERS

A recent decision by the District Court of Appeals in the State of California regarding the right of County Medical Societies to discipline members and to expel or suspend from membership in the society reiterates the general proposition of law that the Courts will not interfere with the medical society's right to expel a member after a fair trial on charges, according to the procedure established in the Constitution and By-Laws of the Society. (Smith vs. Kern County Medical Association, April, 1941.)

In this case a dispute had existed between Dr. Smith and the majority of the members of Kern County Medical Society for some time regarding the practices engaged in by the staff of Kern County General Hospital. The majority of the members of the county society maintained for a long time that the matter of carrying out medical practice in Kern County Medical Hospital was such that patients did not receive adequate service and prevented reasonable competition among physicians in the community.

In 1932 the membership of the county society passed a resolution to the effect that, since the manner of rendering service to patients in the said hospital conflicted with the principles of medical ethics of the American Medical Association, all members of the County Society should resign from the staff of Kern County General Hospital until such time as the institution is conducted in such a manner as to make it eligible to apply as an accredited hospital rating from the Council on Medical Education and Hospitals of the American Medical Association and the Committee on Hospitals of the American College of Surgeons. The resolution further provided that failure of any member of the county society to resign from the staff of the hospital would make such a member liable to disciplinary proceedings. The same general resolution was passed each year until 1939.

In 1932 certain charges were filed against Dr. Smith and in 1933 other written charges were filed against him. No action was taken on either written charge.

In 1935 written charges were made against Dr. Smith to the effect that he was violating the principles of medical ethics of the American Medical Association by disposing of his services under conditions that make it impossible to render adequate service to his patients and also that he disposed of his services under conditions which interfered with reasonable competition among physicians in the community.

These charges were duly served upon Dr. Smith and a time for hearing was set by the Committee on Grievances of the society. Dr. Smith did not appear at the hearing. The Committee recommended that Dr. Smith be expelled from the society. The Board of Directors of the society sustained the action of the Committee on Grievances and voted Dr. Smith's expulsion from the society. At a later meeting of the society the great majority of the members present voted to expel Dr. Smith. However, only 19 of the 38 members of the society were present at the meeting.

Dr. Smith appealed to the California Medical Association and the American Medical Association. Both appeals were decided adversely to him. He then brought a mandamus suit against the County Medical Society to compel the Society to reinstate him as a member.

The Court held that a majority of the membership was necessary to constitute a quorum and that, since a majority of the membership was not present at the society's meeting at which Dr. Smith was expelled he was entitled to reinstatement as a member of the Society.

However, in deciding the case the Court gave a concise statement of the rights of Medical Societies to discipline membership. The court said:

"* * * the courts will not interfere with the internal economy, rules of membership, rules of procedure or discipline of members of a strictly fraternal or social, unconstitutional, voluntary organization in which the members have no severable or divisible priority interest in any portion of its property and where the member's interest in its property is only an incident membership. * * * It is only when there has been an unreasonable and arbitrary invasion of private rights that the courts will interfere and then generally the inquiry will be limited to an investigation of the question of whether or not the society has violated its own rules of procedure. * * * In making such inquiry the Courts will be governed by these well established rules, that the constitution and by-laws of such voluntary association constitute a contract between the Association and its members * * *; that when the accused has been given a fair trial before the tribunals of the Society, according to the procedure established by it, the courts will not interfere; * * * that the proceedings before trial committees are not bound by technicalities; that membership in such an Association is not a right that can be demanded but is a privilege that may be drafted or withheld on the terms and conditions imposed by the Association. * * *"

The court also held that the fact that members of the Committee on Grievances and the Board of Directors were prejudiced against Dr. Smith would not prevent such Committees from performing their duties under the constitution and by-laws of the society.

Some members of the medical profession may have gotten the impression that the result of the decision in the anti-trust suit against the American Medical Association and District of Columbia Medical Society prevented county and state medical societies from pursuing disciplinary proceedings against their mem-

bers. That is not the effect of the anti-trust decision and as a matter of fact the charge of the court to the jury sustained the right of medical societies to discipline their memberships for breaches of principles of medical ethics. However, the court did instruct the jury in the anti-trust suit that, if the defendants were conspired to injure members or if the societies conspired to restrain trade, such action would be illegal.

The result of the anti-trust suit and the above expressed case of Smith vs. Kern County Medical Association is to give the county and state medical societies power to discipline members, providing that the procedure outlined in the constitution and by-laws of the society is followed and provided that the action is not a conspiracy on the part of the people involved.

From Northwest Medicine July 1941.

BETTER BABY

I am a modern baby who must face
Inheritances of the human race;

But medicine and science both combine
To make this prophylactic life of mine.

I'm glad I need not worry over sties
Because of argyrol dropped in my eyes.

And fingerprints will guard my name from doom,
While I enjoy my air-conditioned room.

At breakfast time I'm taken from my crib
To don my waterproof, transparent bib.

Then mashed bananas, milk, tomato juice,
Strained vegetables in cans all serve my use.

Tucked in my sleeping bag, the zippers run
Up to my neck, while napping in the sun.

But I don't mind if days are cold and damp,
I eat my sun, or get it from a lamp.

My arm of punctured serums has a sore
To keep that yellow sign from off our door.

And relatives who in my glee would bask
Must hide behind a germ protecting mask.

But streamlined gadgets cannot alter me,
My temper is old-fashioned as can be.

And when I shriek my lowdest false alarms,
I want to snuggle close in mother's arms.

—Reba Ray, *New York Sun*

SOLDIERS HEART

British medical officers are being prodded, it appears, by the Government on account of the losses in troop efficiency caused by the number of casualties from "soldiers heart." Not only the losses due to soldiers on the sick list but also related losses — doctors, nurses, attendants caring for these casualties; and the money losses incident to the long convalescence and eventual life time pensioning involved in almost all cases of "soldiers heart."

The latest British medical journals received in this country publish articles and other comments on this subject which has been repeatedly discussed in these journals, following the beginning of World War II. The British name for soldiers heart is "effort syndrome."

The likelihood that cases of soldiers heart would unwittingly multiply in the greatly expanded American Army has been discussed during the past few months at convocations of several state and national medical associations. Medical officers of the Army have addressed the members of these associations on the subject of soldiers heart.

The latest issues of the British Lancet and British Medical Journal have shed more light than heretofore on methods for the detection of soldiers heart in men about to be inducted into the services to the end that such men may be rejected at the primary examining stations. No effort appears to have been made to ascertain the cause of soldiers heart. Indeed, there is reason to believe that medical officers consider that soldiers heart is not a disease at all but rather it is a manifestation of heredity; the result of unaccustomed strain; or debilitating illness.

Soldiers heart has been a "headache" to Army doctors, especially in war, during the past three quarters of a century. It plagued the medical men in the War of the Secession. In World War I, British army doctors put 70,000 soldiers on the sick list with "cardiacvascular diseases." Of this number, only 10,000 actually had heart disease while the balance were afflicted with "soldiers heart."

As a direct result of the acceptance of soldier heart applicants into the British Army in the last war, forty-four thousand of these soldiers were made pensioners for life.

The apparent confusion with regard to requisite knowledge to enable medical officers to reject men afflicted with soldiers heart is markedly reflected by the widely varying names which have been tacked onto this affliction: "irritable heart;" athlete's heart;" "effort syndrome;" "soldiers heart;" and "neurocirculatory asthenia" which is associated with morbid fatiguability; with irritation of the nervous system.

Paradoxically, it seems a soldier afflicted with soldiers heart does have a perfectly good cardiac organ in itself but it "acts up" under only ordinary strain and renders the man unfit for normal duty.

The practical inability of medical officers to detect

cases of soldiers heart when recruits are being examined appears to be due to the fact that the heart itself is healthy; it "pounds and palpitates" in circumstances where normal soldiers are unaffected.

The sure indications of soldiers heart are apparent after the men afflicted with it are already in the Army which is bound thereafter to undertake their hospitalization — short breath; anxious face; rapidly acting heart; left breast distress; dizzy. The British army records show that only 15 per cent of soldiers heart cases ever recover.

British medical officers have been instructed to watch for soldier heart cases at primary examination stations, the following "symptoms" are listed — the markedly non-athletic type; men abnormally predisposed to sedantery life; men who are non-smokers and abstainers; men having unusually low incidence to exposure to venereal.

Men having soldiers heart are in reality nervous weaklings, a condition which does not necessarily impair their heart, lungs, and other vital organs nor their vision, hearing, etc.

Men afflicted with soldiers heart stack up as normally healthy persons while being examined in the primary examination station.

—*Army and Navy Register.*

AVAILABLE AT LOWER COSTS

Some of the advocates of compulsory sickness insurance argue that this system should be adopted now as a defense measure. Apparently they are unaware of the more fundamental medical defense projects which are lagging for lack of funds.

The production of blood plasma is a striking example. The Army desires 50,000 quarts a year. As Dr. Morris Fishbein has pointed out, this requires 200,000 donors. To obtain that number of qualified subjects, at least 600,000 persons must be examined, physically and serologically. This would not be a very great expense, compared to the billions which are tossed about so lightly at Washington, but so far the government has made no move to pay for such examinations.

On the same subject, the processing of blood plasma requires special apparatus. At present only five machines are available for this purpose in the entire country. If the government has ordered more, we have not heard of it.

Even such immediately important fields as aviation medicine are not being explored to their limits because grants are made in occasional small sums where a couple of millions are needed.

If the government is having difficulty in financing these unquestionably urgent defense measures, how can it even consider compulsory sickness insurance?

Anything could be a "defense measure" by the definition which includes compulsory sickness insurance in this term. Actually there is nothing obligatory prepayment would supply which is not already available at lower cost.—*New York Medical Week.*

HOW TO OVERCOME BREATHING BY MOUTH WHILE ASLEEP

About the only practical measure to help overcome breathing through the mouth during one's sleep is a sling or bandage that will hold the jaw closed during the night, *Hygeia, The Health Magazine* advises in a recent issue in answer to an inquiry.

"Some people find a solution by going to sleep in a different position — on the side instead of on the back," *Hygeia* says. "But, since most people change positions frequently during sleep, this does not always help . . . . Slings are often worn by chronic mouth breathers — after the removal of an obstruction in their nasal passageways — until they learn to breathe through their noses again. If such a bandage is used, it must be tight enough to keep the mouth closed but not so tight that it will interfere with the circulation of the blood to the skin and thus become unpleasant or painful. If an elastic bandage is used, it must be relatively loose. However, a physician should inspect the nasal passages. These passages may have an obstruction which will permit nasal breathing during waking hours, but during periods of relaxation the obstruction may be sufficient to cause a natural shift to mouth breathing."

Examination of applicants for industrial employment presents an invaluable method for detecting, and thereby isolating, tuberculous infection in the general population.—*A. C. Reid, M. D., Jour. Indust. Hyg. and Toxicol., Oct., 1940.*

Dust swept under the sofa disturbs no one — until it is discovered, nor does tuberculosis hidden from public view.

Health is the greatest of all possessions; a pale cobbler is better than a sick king.—Bickerstaff.

NEW EDUCATIONAL FILM AVAILABLE FOR SHOWING

Under new rules laid down by the American Academy of Pediatrics, their new educational-to-the-public film, "When Bobby Goes to School," may be exhibited to the public by any licensed physician in the United States.

All that is required is that he obtain the endorsement by any officer of his county medical society. Endorsement blanks for this purpose may be obtained on application to the distributor, Mead Johnson & Company, Evansville, Indiana.

Such endorsement, however, is not required for showings by licensed physicians to medical groups for the purpose of familiarizing them with the message of the film.

"When Bobby Goes to School" is a 16-mm. sound film, free from advertising, dealing with the health appraisal of the school child, and may be borrowed without charge or obligation on application to the distributor, Mead Johnson & Company, Evansville, Indiana.

Clinical-Pathological Conferences

J. J. Moore, M.D., Department Editor.

Beginning with this issue of the Illinois Medical Journal it is our purpose to present material each month obtained from the large number of clinical pathological conferences held regularly in the hospitals of Illinois. It is obvious that only a fraction of these cases can be published. Cases will be selected for their general interest and for their diagnostic problems.

The pathologists are appreciative of this new outlet for publication of much instructive material which would be limited to presentation before one hospital staff.

It is quite fitting that the first cases selected should be from the Research and Education Hospitals of the University of Illinois College of Medicine.

PRESENTATION OF CASES BY

SAMUEL A. LEVINSON, M.D.

From the Laboratories of the Research and Educational Hospitals, University of Illinois College of Medicine, Chicago.

CONSTRICTIVE TUBERCULOUS PERICARDITIS

ABSTRACT OF HISTORY

Past History. A 30 year old white male was admitted to the medical ward of the Research and Educational Hospitals with the complaints of pleurisy with effusions, duration 5 years; substernal pain and dyspnea for 2 months. Five years prior to admission to the hospital patient developed a pleurisy with effusion. He was immediately hospitalized and treated for the effusion after which time he was removed to the Municipal Tuberculosis Sanitarium where he remained for four months. The right pleural cavity was aspirated several times and the laboratory tests for tuberculosis were performed with consistently negative reports. The chest trouble persisted and about two months prior to admission, a substernal pain developed. His family physician informed him that he had a pericarditis and his heart was enlarged. On admission his

Physical examination revealed a B.P. 112/86; P. 72; R. 24; and T. 98.6°. Head and neck were essentially normal and there was no gross deformity of the chest wall. The heart was enlarged both to the right and left but there were no audible murmurs and the heart tones were of good quality and regular in rhythm. Examination of the lungs revealed a generalized tactile fremitus with dullnes below the 5th interspace on the right side and hyperresonance on the left side. Breath sounds were decreased over the entire right lung field and were louder and more distant on the left. The diaphragm was movable on both sides. The abdomen was essentially normal.

Laboratory Findings

B.P.	Normal Breathing	Pulse Pressure	Expiration	Inspiration
	112/94	18	112/94	108/88
	116/94	22	112/98	108/96

Vital Capacity: 2000 cc. (58% normal)
1775 cc. (50% normal)
1300 cc. (38% normal)
1100 cc. (24% normal)

Venous Pressure 20.5 cm. (normal 6-10)
Ether time 12.6 seconds (normal 4-6)
Decholan 23 seconds (normal 10-18)
X-ray showed cardiac movements to be slight to pulsation. Roentgenkymogram. Limitation motion involving left ventricle.

E.K.G. was significant for a pericarditis.

Peritoneoscopy 8000 cc. clear yellow fluid. S.G. 1020. Total protein 3.35%. Lympho. few polys and r.b.c. No carcinoma or tbc. noted. Later 3400 cc. removed. S.G. 1015; total protein 3.7%. Bromsulf. 5 minutes 60%. 30 minutes 15%. Clotting time 5 min. Bleeding time 90 sec. Prothrombin 68% normal. Hglb. 13 gm. R.B.C. 5.2; W.B.C. 13.2. Urine examination essentially normal.

Presented before the Illinois Society of Pathologists at the 101st meeting of the Illinois State Medical Society, Chicago, May 20, 1941.

NPN	S.A.	S.G.	Icterus Index	Wassermann and Kahn
27.5	4.15%	2.85%	10	negative
	4.0	2.1		
	3.6	2.8		
	3.6	2.7		

Clinical Impression. Tuberculous infection of the right lung with an effusion and a pericarditis.

Hospital Course. The diagnostic procedures were continued in the form of a sputum and stomach wash for acid fast organisms all of which were negative. Guinea pig inoculation, (stomach wash), however, proved to be positive for tuberculosis. The patient had a "Pulsus Paradoxus" and there was a continued pulse pressure reduction and a decrease in the vital capacity. Developed induration left arm and thrombosis. Temperature elevated. Because of the increased ascites and positive evidence of constrictive pericarditis surgery was performed and a portion of the pericardium over the right ventricle was removed. On the first post operative day surgical emphysema developed involving the neck, face and upper extremities. Patient's course was steadily downward and he expired at the end of the first post operative day.

NECROPSY EXAMINATION

The body was that of a well developed and well nourished adult white male and there was a subcutaneous swelling of the periorbital tissues of the left eye causing its closure. There was also a generalized subcutaneous emphysema of all the tissues above the waist line and including the upper extremities. There was a recent curved surgical incision 33 cm. long in the region of the left pectoral area and it extended along the left mediastinal margin for approximately 10 cm. and then curved to the left beneath the nipple for approximately 23 cm. Just medial to this incision there was another incision 4 cm. in length through which a rubber drain projected. Superior to the sternal notch there was another skin incision 6 cm. in length and the site of a recent tracheotomy. The chest was distended and symmetrical and the abdomen was also distended and there was a pitting edema of both lower extremities.

Abdomen. There was approximately 1200 cc. of a cloudy grayish yellow fluid and the peritoneal surfaces for the most part were smooth and semi-glistening with the exception of a small area over the region of the ileum proximal to the ileocecal valve. In this area the serosal surfaces were studded with small white elevated nodules scattered over an area approximately 4 cm. in length. A similarly studded area was seen on the abdominal surface of the diaphragm on the right side. The diaphragm arched to the fourth interspace on the right and the fifth interspace on the left side.

Chest. Beneath the curved surgical incision mentioned previously there was a portion of the left third, fourth, fifth and sixth ribs which had been removed and the pre-pericardial tissues were exposed. The left lung lay collapsed with the exception of some fine fibrous adhesions in the apical portions and there was approximately 400 cc. of clear straw colored fluid in the pleural cavity. The right pleural cavity was obliterated by fibrinous adhesions. There was a surgical opening in the pericardial sac exposing the apical portion of the right ventricle of the heart. The pericardial sac was markedly thickened and its inner surface was either covered by irregular masses of yellow cheesy material or closely adherent to the epicardium by irregular amounts of the same yellow material plus fibrous adhesions. The pericardial cavity for the most part was obliterated.

Heart weighed 225 gm. The epicardium was covered by an irregular layer of yellow fibrinous material and the subepicardial fat was indistinct. The myocardium was red brown in color and measured up to 7 mm. in the left myocardium and the granulation tissue covering the right epicardium was 2 mm. in thickness. There was a similar granulation tissue which was 2 mm. in thickness covering the left myocardium. The various leaflets of the heart were grossly uninvolved, and the aorta did not show any gross remarkable changes.

Lungs. The right lung for the most part showed a diffuse fibrosis along the vertebral border while the anterior portion was grayish blue in color and there were ragged bits of fibrous tissue adherent to the visceral pleura. The surface made by cutting showed that there were many bronchioles which were dilated and bulged above the surface and in the parenchyma of the lung there were small miliary tubercles.

The left lung was covered on the posterior aspect by pleural adhesions and multiple miliary

tubercles were scattered on the visceral pleura. There was a small laceration of the visceral pleura which involved the lung parenchyma in the lower portion of the anterior surface of the upper lobe. The area was discolored by hemorrhage and had two small bullae. This latter area was in the vicinity of the surgical incision in the anterior chest region. The surface made by cutting of the left lung also showed numerous miliary nodules scattered throughout the parenchyma.

G. I. Tract was grossly normal except in the lower 30 cm. of the ileum there were three ulcerations of the intestinal mucosa. They had elevated margins which were slightly undermined and their greatest diameter was 2 cm. in the longitudinal direction of the lumen. The base of the ulcer was grayish red in color with small yellow tubercles in the center. These tubercles coresponded with those mentioned that were seen on the serosal portions of the intestine in this region. There was a similar ulcer in the cecum just distal to the ileo-cecal valve and resembled in all respects the ulcer described in the terminal portion of the ileum.

The other organs were essentially normal.

Histological section from the myocardium was demonstrated to show the area of necrosis which was surrounded by a zone of lymphocytes with many Langhans giant cells and in the periphery of the section was the myocardium.

Comment. We have recently observed that in our series of constrictive pericarditis we have found that tuberculosis was the etiologic factor more frequently than rheumatism. We pointed out to you that there was fluid in the right lower quadrant of the abdomen with ulcerative tuberculous lesions in the terminal ileum and in the cecum, as well as the pathology demonstrated in the lungs, and that we might here be dealing with an exudative form of tuberculosis. The tuberculous pericarditis is often associated with a pleuritis and a peritonitis. Also, the constrictive pericarditis which acts as a tamponade around the heart was a form of concretio cordis. The French have also described a cirrhosis of the liver which is associated with tuberculosis, particularly tuberculous pericarditis, and this they have called a cardio-tuberculous liver.

ANATOMICAL DIAGNOSIS

1. Pulmonary tuberculosis.
2. Tuberculous pericarditis.
3. Recent surgical removal of part of the pericardium.
4. Fibrous replacement of the right ventricular musculature.
5. Fibrous obliteration of the right pleural cavity.
6. Hydrothorax, left.
7. Bronchiectasis.
8. Pneumothorax, left.
9. Tuberculous peritonitis.
10. Tuberculous ulcers of the ileum and cecum.
11. Ascites.
12. Surgical emphysema of the torso and upper extremities.
13. Pitting edema of the lower extremities.
14. Recent surgical incision in the left pectoral area.
15. Recent tracheotomy.

DISCUSSION

Dr. Warren H. Cole, Chicago: From a surgical standpoint there are several points we can bring up which are interesting and a bit confusing. In the first place I want to be sure to differentiate between constrictive and adherent pericarditis. The results of operation on the constrictive type are perhaps the more dramatic. Most of these cases are due to tuberculosis; that is our experience and many reports in the literature agree to this assumption. The diagnosis of constrictive pericarditis is made with difficulty. These cases are confused with two lesions; congestive heart failure and hepatic cirrhosis. In brief, differentiation may be made as follows: in the first place, the heart is relatively normal in size in constrictive pericarditis whereas in congestive heart failure it is very large. In constrictive pericarditis you will have an ascites preceding the edema of the extremities, whereas in congestive heart disease edema precedes the ascites. In the former disease a paradoxical pulse is almost constantly observed. In hepatic cirrhosis the heart will probably be of normal size; a delayed circulation time and an increased venous pressure will be present.

In the case just presented, an active pulmonary tuberculosis was known to be present and progressing; we suspected that the pericarditis was likewise active and not completely resolved into a fibrous type. For that reason I suggested to Dr. Keeton that operation be postponed. About two weeks later we received a hurried call and were told that if we did not do something to relieve the cardiac embarrassment the man would die. We agreed to take the chance, and at operation found a tuberculous pericarditis with an accompanying cardial tamponade affecting the ventricles primarily. This, of course, was not a typical case for resection of pericardium, but we thought it best to remove the roof of the pericardium and

decompress the heart, hoping it would relieve the heart sufficiently to allow recovery from his pulmonary lesion.

The mechanism of death was very interesting and to me confusing. Dr. Levinson told you about the emphysema that developed in the neck and the mediastinum which was the cause of death. Where did that air come from? I think the pleural reflection was in such a position that with each heart beat a little air was forced into the mediastinum from the drainage site, giving rise to a constantly increasing emphysema. Omission of the drainage site might have eliminated the emphysema. Yet if you do not drain these cases you get an acute cardiac tamponade — so you are in reality between two fires.

CARCINOMA OF THE HEAD OF THE PANCREAS WITH METASTASES

ABSTRACT OF HISTORY

This 54 year old white male was admitted to the hospital with complaints of diffuse abdominal pain and a weight loss of 30 lbs. during the previous four months. The abdominal pain was more severe on the side upon which he was lying. Past history revealed that his father, a sister and brother died of tuberculosis. His mother died of P.A. and another sister of carcinoma of the stomach. He also had typhoid fever at the age of 16.

Physical examination on entrance; T. 100; P. 112; R. 24; B.P. 110/60. At the base of the left lung there was dullness, decreased tactile fremitus, a friction rub and subcrepitant rales. The liver was enlarged four fingers and there was muscle rigidity over the entire upper abdomen. There was tenderness in the right and left lumbar regions.

Laboratory Findings. X-ray of the abdomen and G.I. Tract essentially negative. Chest x-ray showed collapse of left lung and a small localized pneumothorax about the apex. Three fluid levels noted on the left, the lower one at the level of the 11th rib dorsally. Later films showed increased density suggestive of pneumonic infiltration.

R.B.C. 3.83; W.B.C. 22.9; hemoglobin 60%. Wassermann and Kahn negative. Stools negative for blood and amoeba, agglutination reactions negative. Chest fluid bacteriologically negative.

Clinical Impression. The differential diagnosis was between a pneumonia, subdiaphragmatic abscess, hepatic abscesses, and a malignancy of the liver.

Hospital Course. On aspiration of the left chest 1000 cc. of serosanguinous fluid was obtained. T. up to 101°; P. 120 and R. 40. Patient had 8-10 stools daily for a while and these were examined repeatedly for amoeba with negative results. Proctoscopic examination was also negative. He showed no improvement on treatment with sulfapyridine, emetine, blood transfusions and nasal oxygen. On 2/5/41 patient was explored with a left subcostal incision. The liver was found to be studded with metastatic nodules one of which was taken for biopsy. Biopsy revealed an adenocarcinoma most likely of pancreatic origin. Patient continued to go downhill and expired on the seventh post operative day.

Blood Chemistry

Glucose	N.P.N.	Urea N.	Creatinine	Chlorides	CO_2	Icterus Index
95	61	40.6	1.05	470	55	33
	38	25.0		452	66	77
	60	34.2		467	81	
	26	12.4		455	74	
	83.3					

Serum Albumin	Serum Globulin	Serum Amylase	Fibrinogen
3.1%	1.9%	276 mg. glucose 100 cc.	0.37%
3.0	1.84	182	
3.0	2.4	523	
2.9	2.1	229	
2.9	1.7	184	
2.7	2.2		

NECROPSY EXAMINATION

The mucous membranes were pale and had an icteric tint. The tongue and mucous membranes were covered with sordes. There was a marked generalized wasting of the subcutaneous fat, as well as an icteric tint of the skin of the entire body. There was a recent subcostal surgical incision in the left upper portion of the abdomen which was 8 cm. in length, as well as a marked pitting edema of the lower extremities.

Chest. The right lung was firmly adherent to the chest wall by dense fibrinous adhesions. The left lung lay collapsed and was bound down to the lateral thoracic wall in two separate areas by dense fibrous adhesions, at about the level of the third rib and the fifth rib. This formed three separate pockets, one at the apex, at the mid portion and just above the diaphragm. Each of these pockets contained a varying amount of dark cloudy yellowish red fluid totaling approximately 600 cc. in the entire left pleural cavity. The pleural surfaces were studded with numerous grayish white tumor nodules that measured 2-3 mm. in diameter.

Abdomen. The abdominal cavity contained approximately 1000 cc. of cloudy blood tinged fluid. The intestinal loops lay free and were moderately distended. The liver extended 7 cm. below the costal margin in the right anterior axillary line. There was a large globular tumor which measured approximately 6 cm. in diameter that was palpated in the region of the head of the pancreas.

Heart. The pericardial sac was smooth and had an icteric tint and the pericardial cavity contained 30 cc. of a clear yellow fluid. The heart weighed 280 gm. and the epicardium was studded with numerous grayish white tumor nodules measuring 2-3 mm. in diameter. The myocardium was softer than normal in consistency and had a dull tan brown color. On the free edge of the posterior mitral leaflet there was a large friable warty vegetation that measured 1 cm. in diameter and adjacent to this there was similar smaller vegetations up to about 5 mm. in diameter. Similar deposits were seen on the posterior wall of the left atrium and on the aortic cusps. The endocardial surfaces had an icteric tint.

Lungs. The right lung was partially collapsed and was flabby and airless. The left lung was collapsed, flabby and airless and the pleura was thickened to about 2 mm. and studded with numerous grayish white tumor nodules over the entire surface.

Liver weighed 3330 gm. It was grossly enlarged and the entire surface was studded with numerous tumor nodules that varied in size from 2 - 4 cm. in diameter. Some of these have a grayish white color with a central depression. These centers have a pinkish red hemorrhagic appearance. The liver itself was firmer than normal in consistency and the grayish tumor areas were firm. The uninvolved portion of the liver was smooth and had a dark greenish tan color. The surface made by cutting revealed numerous tumor nodules to be scattered throughout the liver parenchyma. The gall bladder and its ducts were grossly uninvolved except for several gray white tumor nodules 2-3 mm. in diameter which were adherent to the outer surface of the fundus of the gall bladder. The peripancreatic lymph nodes and the nodes surrounding the bile duct were quite enlarged and firm and the nodes in the vicinity of the bile ducts compressed the ducts. The bile ducts were dissected out and found to be grossly uninvolved.

Spleen weighed 210 gm. It had a smooth slate colored capsule and was firm in consistency and in the superior pole of the spleen there was a hemorrhagic infarct. There was also a small accessory spleen 1 cm. in diameter which was adjacent to the tail of the pancreas.

Pancreas and tumor mass weighed 330 gm. The primary tumor was obviously in the head of the pancreas which was grossly enlarged to a diameter of 8 cm. The tumor was hard, gray white and on section showed numerous hemorrhagic areas scattered throughout. There were also several bright yellow flakes 1-2 mm. in diameter which grossly appeared to be areas of necrosis on the surface of the pancreas. The body and tail of the pancreas were infiltrated with small grayish white tumor masses.

Adrenal glands weighed 20 gm. and were grossly uninvolved.

Kidneys. Both weighed 370 gm. and were grossly unchanged except for several healed anemic infarcts.

G.I. Tract was grossly unchanged except in the region of the ampulla of Vater which was firm and infiltrated on its outer portion with tumor tissue.

Thyroid gland was grossly normal.

Histological section was demonstrated from the region of the pancreas and the liver to show the carcinoma of the acini of the pancreas.

Comment. Primary carcinoma of the pancreas is not uncommon and most authorities believe that the most common location for carcinoma of the pancreas is in the head of the pancreas. However, there are exceptions to this opinion, and in one of the large hospitals in Chicago, one of the pathologists reported that in primary carcinoma of the pancreas 60% occur in the tail of the pancreas.

As to the histological picture of carcinoma of the pancreas there is, 1) a cylindrical cell type or the adenocarcinoma which originates from the ducts, and then, there is 2) the type that involves the island of Langerhans and this is associated with a marked hypoglycemia, and 3) carcinoma simplex which originates from the parenchyma of the pancreas. This latter type is a rapidly growing diffuse carcinoma. It is as a rule firm, but at times might be soft in consistency and on histological examination the cells resemble the pancreatic alveoli and these are large, granular and hydropic, and sometimes might show fatty changes.

AUTOMATICAL DIAGNOSIS

1. Carcinoma of the head of the pancreas with multiple metastases to the liver, abdominal lymph nodes, right adrenal gland, gall bladder, pleura and pericardium.
2. Acute bacterial endocarditis.
3. Massive collapse of the left lung.
4. Dense fibrinous pleural adhesions, bilateral.
5. Hydrothorax, left.
6. Multiple ancient infarcts of the kidney.
7. Infarction of the spleen.
8. Accessory spleen.
9. Jaundice.
10. Emaciation.

DISCUSSION

Dr. Warren H. Cole: This represented a very difficult case diagnostically. In the first place, his history was very suggestive of perforated ulcer and we were never certain of the diagnosis until we made our exploratory incision. As you know, he had fever, pain and leukocytosis, all of which were consistent with some chronic infection. He had a history of a sudden onset of pain which made him collapse. We, therefore, were led to think of a perforation of a duodenal ulcer followed by a subdiaphragmatic abscess. When he came in he had evidence of fluid in his left pleural cavity, which fits in well with a subdiaphragmatic abscess. We tapped him and got some serous fluid which did not give us much help diagnostically. He had a large mass in the upper abdomen which was palpable. As Dr. Levinson said, he likewise had an elevated serum amylase. That finding, in reality, made the diagnosis but we did not listen to it. We know that he could not have an elevated blood amylase without an obstruction to the pancreatic ducts. We also know that carcinoma of the pancreas will produce a high blod amylase in over fifty per cent of the cases; so will pancreatic cysts. Acute pancreatitis produces a rise more consistently but it occurs early and lasts only two or three days. We were confronted with the possibility of infection. Because he had a history of diarrhea we gave him a course of emetin, but in the absence of favorable effect we thought we had ruled out amoebic abscess of the liver.

Realizing the possibility of carcinoma and subdiaphragmatic abscess we thought we could not do any harm by making a small incision under local anesthesia. That showed large liver with implants of carcinoma; a positive diagnosis was then obtained. The lesson it taught us was to pay more respect to an elevated blood amylase.

NEUROBLASTOMA OF THE ADRENAL GLAND WITH METASTASES.

ABSTRACT OF HISTORY

Past History. This 22 month old white male infant was admitted to the hospital with the following history. The child was perfectly well until the age of 18 months at which time he fell and three days later developed a protrusion of the right eye and pain in this region. The protrusion returned to normal over a period of a month when the patient fell again three weeks before admission. Three to four days following this second fall the child developed a proptosis and ecchymoses of both eyes. The child had a fever for several days before admission and complained of pain in the eyes, but there was no vomiting or neurological signs. Since the time of the first fall patient had walked poorly and stumbled frequently and had difficulty in seeing. The past history was essentially negative.

Physical examination. On entrance revealed a well developed male infant 22 months of age with a marked bilateral proptosis and periorbital

ecchymotic discoloration. The head seemed enlarged in proportion to the age of the child. B.P. 108/68. The remainder of the physical examination was essentially negative.

Laboratory findings. Blood — R.B.C. 3.75; hemoglobin 9.5 gm.; urine negative. Wassermann and Kahn tests negative. Spinal fluid pressure 340 mm. Spinal fluid was slightly xanthochromic. Blood culture was negative. X-ray of the skull showed an increased density involving the anterior part of the skull and bones about the right orbit and posteriorly behind the vertex. X-rays of the abdomen, chest and long bones were negative.

Clinical Impression. An intracranial neoplasm, probably a hemangioma, and a metastatic neuroblastoma was considered.

Hospital Course. The child continued to run an elevated temperature and was somewhat somnolent. He cried at intervals, especially when being fed. He was given x-ray therapy to the skull after which there was some improvement in child's mental condition. However the proptosis increased and there was increased difficulty in feeding. Course was gradually downhill and child expired 1½ months after admission.

NECROPSY FINDINGS

The veins on the forehead were prominent and the head was enlarged in proportion to the body and there was a separation of the suture lines which could easily be palpated. There was a marked proptosis of both eyes with a subcutaneous ecchymoses around both orbits. The orbits protruded for approximately 7 mm. anterior to their normal position. The testicles were undescended and could be palpated in the inguinal canals. On the anterior surface of the sternum there were two nodular dark red areas which measured 8 mm. in diameter.

Abdomen. The peritoneal surfaces were smooth and glistening and the urinary bladder was distended for 5 cm. above the symphysis pubis. The abdominal lymph nodes were enlarged, particularly the peripancreatic group and the peribiliary group. These nodes were soft in consistency and pink red in color.

Heart weighed 90 gm. and grossly did not show any remarkable changes.

Lungs were grossly normal.

Liver weighed 650 gm. It was normal in consistency and brownish red to yellow in color. There were two subcapsular nodules on the superior surface of the right lobe of the liver which measured 5 mm. in diameter and appeared to extend into the parenchyma for a distance of about 5 mm. On section the lobular markings were somewhat indistinct although there were several light pink red areas of tumor tissue which had infiltrated the liver parenchyma along the larger blood vessels. The gall bladder and its ducts were grossly normal.

Spleen weighed 70 gm., the *pancreas* weighed 45 gm. and the *thyroid* 5 gm. and showed no gross abnormal changes.

Adrenals. The right adrenal weighed 8 gm. and did not show any gross pathologic changes. The left adrenal gland had been replaced by a large globular tumor mass which was encapsulated and measured 5.5 cm. in diameter. Externally the tumor had a light gray blue lobular surface and could easily be separated from the superior pole of the left kidney. The tumor was moderately firm in consistency and the surface made by cutting showed that it bulged considerably from the capsular margin and was of a bright purplish red color with small scattered hemorrhagic areas of a darker purple color. Grossly one could not demonstrate any normal adrenal tissue.

Kidneys. The left kidney weighed 60 gm. and the right 40 gm. and grossly were unchanged.

G. I. Tract was normal.

Head. There was a marked thickening and erosion of the diploic portion, and the inner table of the frontal bone in the region of the calvarium was obviously invaded by tumor tissue and presented a purplish red trabeculated appearance. There was a marked variation in the thickness of the skull in the frontal area which measured 2 cm. in thickness while the parietal region was of almost paper-like thinness. On the inner surface of the frontal and temporal bones the dura was irregularly elevated by numerous nodular elevations of tumor tissue, measuring from 5-20 mm. which bulged upon the meningeal surface. The nodules were soft in consistency and had a pinkish gray to yellowish gray appearance while the underlying dura was of a glistening light bluish gray color. The

longitudinal sinus was entirely thrombosed and invaded by tumor tissue. The occipital and lateral sinuses also contained small thrombi. In the region of the sphenoid bone and internal occipital protuberances the dura was elevated from the base of the skull by large fungating dark red masses of tumor which produced an irregular erosion of the underlying bone. The base of the skull was diffusely infiltrated by tumor tissue about the orbits, ethmoid and sphenoid bones, causing compression of the structures in this region.

Brain weighed 1060 gm. The consistency was greatly diminished. The leptomeninges at the base of the brain about the chiasm were thickened and whitish. The frontal and anterior portions of the parietal lobes were irregularly depressed and the leptomeninges over the superior aspect in this area were diffusely discolored yellowish brown.

Histological section was demonstrated from the tumor of the left adrenal gland, as well as through the frontal cortex of the brain. The leptomenix was infiltrated by a thin layer of abnormal cells. In the central portion of the dura there was evidence of calcification and in the region of the leptomenix there were cells with dark nuclei and some showing mitotic figures.

Comment. Tumors of the adrenal gland may involve the cortex or the medulla. In this case the histological picture as well as the gross findings are of a neurocytoma and this tumor may simulate the histology of tumors arising in the sympathetic ganglia. Some observers attempted to separate the neurocytomas into two groups. 1) The Hutchinson's type which metastasize to the cranium and is associated with trauma, ecchymoses of the eyelids and proptosis, and 2) The Pepper's type which metastasizes to the liver, as a rule. The separation of this type of tumor into these groups may be satisfactory for teaching purposes, however, as you know, one cannot be too dogmatic in the distribution of tumors in the body. They do not necessarily follow a definite pattern. Although in this case presented it does simulate in many respects the Hutchinson's type of a neurocytoma, there is also evidence of the Pepper type because we have found tumor metastases in the liver.

ANATOMICAL DIAGNOSIS

1. Neuroblastoma, left adrenal gland with metastasis to the abdominal and peripancreatic lymph nodes, skull, dura, liver, pancreas, sternum and lung.
2. Fatty degeneration and congestion of the liver.
3. Marked proptosis, bilateral.
4. Ecchymoses of the periorbital tissues.

DISCUSSION

Dr. Warren H. Cole: This was a typical case of neuroblastoma of the adrenal gland. It is a beautiful textbook picture. We should be able to make the diagnosis more accurately. The only reason we do not is that the disease is uncommon. It is a disease of the sympathetic system, — a tumor of the sympathetic system just as ganglioneuromas and paragangliomas are. This tumor can be confused with pheochromocytomas which are tumors of the chromaffin system in the medulla. Patients with pheochromocytomas have intermittent hypertension which is quite dramatic diagnostically. True, it is a tumor of the medullar just as other nervous system tumors are. They are more amenable to surgery but are not so malignant. Tumors of the adrenal cortex are still different. The ones that are most interesting to us surgically are the adenomas which produce changes in sex characteristics and likewise are very amenable to surgery.

BUT THE PUBLIC LIKE 'EM

Margaret Widdemer, the poetess, contributes to *The Saturday Review* the following rather caustic comments on "A Recent Form of Literature."

There ought to be a Bull or Proctor
To check these books about a Doctor.

Doctors Galahad, Bradley, Roger,
The Doctor's Date, the Doctor's Lodger,
The Doctor's Villa, Buggy, Jungles,
(Oddly, never The Doctor Bungles)
The Doctor's Odysseys, Citadels;
The Doctor Silent; The Doctor Tells;
The Doctor Remembers; The Doctor Forgets;
The Doctor's Dog and his other pets;
The Doctor's Son, The Doctor's Wife;
The Doctor Looks at Love and Life.

(They're all as noble as can be;
Not one of them would split a fee
Or yank a passing tonsil out
Upon a merry sporting doubt
Or leave retractors in your tummy
Through lightheart haste to bridge or rummy.)

They're charming books — yes, that's quite clear —
But, Doctor, I've been sold the idea.
The one called "Doctor Here's Your Hat" —
Couldn't we leave the thing at that?

News of the State

PERSONALS · COMING EVENTS · MARRIAGES · DEATHS

RUSH MEDICAL COLLEGE MERGED WITH UNIVERSITY OF ILLINOIS

On July 3, Rush Medical College and the Presbyterian Hospital of Chicago became a part of the University of Illinois College of Medicine. Rush Medical College will have its name preserved as a Division of the University of Illinois College of Medicine, and the merger will make the U. of I. medical department one of the strongest in the United States.

NEW MEDICAL CENTER ON CHICAGO'S WEST SIDE

Early in June, the bill proposing to aid in the developing of a new medical center on Chicago's West Side, was passed by the state legislature and as it was signed by Governor Green the law is now operative. A Medical Center Authority was created to develop a medical center, and which will be permitted to erect new buildings and create park facilities. This law should aid materially in increasing Chicago's claim to the medical center of the United States.

DOCTORS INVITED TO NINTH DISTRICT POST-GRADUATE CONFERENCE MT. VERNON, SEPTEMBER 4

All doctors of Southern Illinois have been invited to attend the first Post-Graduate Conference sponsored by the Ninth Councilor District at Mount Vernon, Thursday, September 4th.

Doctor Andy Hall, Councilor, and those responsible for the program announce that plans have been made to carry out the following conference:

12:00 Noon — Buffet Luncheon — Hotel Emmerson (Compliments of Jefferson-Hamilton County Medical Society)
1:30 P. M. — "Diagnosis and Treatment of Neurotics"
2:30 P. M. — "Enterocolitis of Infants and Children"
3:30 P. M. — "Common Skin Diseases"
4:30 P. M. — "Treatment of Fractures"
6:30 P. M. — Dinner at Emmerson Hotel
7:30 P. M. — "The Acute"

Speakers from Chicago and St. Louis are being secured to present the program.

The July issue of the Mississippi Valley Medical Journal was designated as the "ALL CHICAGO" number, as all of the papers appearing in the number were presented at the last annual meeting of the Mississippi Valley Medical Society held in Rock Island. The Chicago papers were presented by Doctors Cleveland J. White, Italo F. Volini, Maurice L. Blatt, Leon Unger, Walter L. Palmer, Herbert E. Schmitz, Manuel E. Lichtenstein and Robert E. Lee.

At the annual meeting of the Chicago Society of Internal Medicine held May 26, the following officers were elected:

President: Andrew C. Ivy
Vice-President: Harold C. Lueth
Secretary-Treasurer: Richard B. Capps

At the Annual Meeting of the Chicago Gynecological Society held June 20, the following officers were elected:

President: Charles E. Galloway
President-Elect: Edward Allen
Vice-President: William J. Dieckmann
Treasurer: Ralph A. Reis
Secretary: James A. Gough
Pathologist: Herbert E. Schmitz
Editor: Garwood C. Richardson

At the annual meeting of the Sangamon County Medical Society held on June 5th the following officers were elected:

President: B. W. Hole
Vice-President: James Graham
Secretary-Treasurer: Nelson Chesnut

The following doctors attended the summer course in Obstetrics and Pediatrics offered at the University of Illinois College of Medicine during the weeks of July 7th and July 14th, and June 23rd:

B. A. Richardson — Emington
Jenkins Hightower — Chicago
Paul Immerwahr — Downers Grove
L. Lazarczyk — Chicago
D. L. Dickerson — Danville
E. E. Davis — Avon
W. F. Stenelle — Shawneetown
Paul Ashley — Chicago Heights
J. J. Klein — Harrisburg
Dick Frericks — LaGrange
S. C. Kaim — Rock Island
G. F. Edwards — Pinckneyville
C. J. Foley — Waukegan
Frank Gatti — Centralia
B. Q. Dysart — Henry
William Schuette — Mason City
E. D. West — Moline
P. E. Reid — Sparta
W. L. Whitten — Indiana, Pa.
F. D. Newmark — Chester
C. E. Eisele — East St. Louis
M. J. Haughton — Greenup
L. D. McMillan — Xenia
Hugo Long — Chicago Heights
John Patt — Chicago
Reno Ahlvin — Kankakee
Royal C. McLean — Kirkwood, Mo.

MARRIAGES

Michael Boley to Mrs. Marcella Shannon, both of Chicago, June 4.

George Augustine Goder, Chicago, to Miss Elizabeth Mitchell Flynn of Arlington Heights, Ill., June 28.

Dr. Ralph P. Peairs and Miss Nina B. Crigler announce their marriage on July 24th at Denver, Colorado. At home after September 1st at 302 North Castle Street, Normal, Illinois.

Deaths

Harry Amant, Springfield, Illinois; McGill University Faculty of Medicine 1910, Quebec; aged 61; died, June 27.

George L. Brooks, Chicago; Hahnemann Medical College; aged 63; died, July 2.

Josie C. Kennedy Diederich, Rochelle; University of Illinois College of Medicine, 1901; died June 7.

John R. Neal, Chicago; Northwestern University Medical School, 1909; aged 61; died July 1.

Howard Russell Sword, Milledgeville, Ill.; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1910; formerly member of the board of health; aged 60; died, May 21, of cerebral hemorrhage.

Fred Clark Taylor, Peru; Indiana State Medical College, 1894; aged 68; died June 29.

T. E. Walton, Danville; Kentucky School of Medicine, 1889; aged 80; died May 29.

Robert Alexander Hanna, Peoria; Keokuk Medical College, 1894; aged 73; died July 15. Doctor Hanna was founder and head of the Hanna Clinic. For 43 years he was a member of the staff of Proctor Hospital and an honorary member of the staffs of St. Francis and Methodist Hospitals. He was at one time President of the Peoria City Medical Society. A deep student devoted to the arts of his professsion, and a prodigious reader, Dr. Hanna possessed a broad liberal culture as well as an appreciation of humor and an original philosophy that won for him countless warm friendships in every walk of life.

Joseph Hannibal Howard, Chicago; Meharry Medical College, Nashville, Tenn., 1904; on the staff of the Provident Hospital; aged 62; died, May 12, of cerebral hemorrhage.

Alice Florence Piper Rud, Chicago; Woman's Medical College, Chicago, 1889; aged 76; died, May 23, of myocarditis and nephritis.

Walter Wile Hamburger, Chicago; Rush Medical College, Chicago, 1906; clinical professor of medicine, University of Chicago, The School of Medicine; formerly assistant clinical professor of medicine at his alma mater; member of the Central Society for Clinical Research, Association of American Physicians and the American Society for Clinical Investigation; formerly member of the board of directors and treasurer of the American Heart Association; member of the executive committee of the board of governors of the Institute of Medicine of Chicago; served as a major during the World War; at one time on the staff of the Cook County Hospital; for many years senior attending physician on the staff of the Michael Reese Hospital; aged 59; died, June 27, in Lake Lure, N. C., of coronary thrombosis.

James J. Walsh, Danville, Ill.; Loyola University School of Medicine, Chicago, 1917; on the staff of the Veterans Administration Facility; aged 54; died, May 8, in the Veterans Administraton Facility, Hines, of carcinoma of the urinary bladder.

William Henry Wilson, Joliet, Ill.; Hahnemann Medical College and Hospital, Chicago, 1898; fellow

of the American College of Physicians; member of the American Society of Clinical Pathologists; for many years on the staff of the Silver Cross Hospital; aged 74; died, May 15, of cerebral thrombosis.

OTIS M. TURNER, Sumner, Ill.; Eclectic Medical Institute, Cincinnati, 1898; at one time mayor; aged 72; died April 28, in Anna (Ill.) State Hospital of arteriosclerosis.

JAMES STEFFENS, Chicago; American College of Medicine and Surgery, Chicago, 1905; aged 65; died, May 11, in the Veterans Administration Facility, Hines, Ill.

EUGENE H. BURRIDGE, Chicago; Bennett College of Eclectic Medicine and Surgery, Chicago, 1877; aged 85; died, May 13, of cerebral hemorrhage.

THOMAS CLINTON SERIGHT, Chatsworth, Ill.; Jefferson Medical College of Philadelphia, 1889; aged 79; died, April 29.

HENRY PERKINS FITZPATRICK, Chicago; Rush Medical College, Chicago, 1896; aged 73; died, May 14, of organic heart disease.

JAMES W. MACDONALD, Aurora, Ill.; Northwestern University Medical School, Chicago, 1892; member of the Western Surgical Association; formerly chairman of the city board of health and health commissioner; aged 74; on the staffs of St. Charles Hospital and St. Joseph Mercy Hospital, where he died, May 21, of hypostatic pneumonia and chronic myocarditis.

JOSEPH MICHAEL O'MALLEY, Ohio, Ill.; St. Louis University School of Medicine, 1907; member of the Illinois State Medical Society; president of the board of education; aged 65; died, May 23, when the automobile in which he was driving was struck by a truck.

JESSE BRENTON COPPENS, Chicago; Loyola University School of Medicine, Chicago, 1917; on the staff of the Martha Washington Hospital; aged 58; died, May 26, of chronic myocarditis.

ORA RICHARD SAUL, Dana, Ill.; Chicago College of Medicine and Surgery, 1914; member of the Illinois State Medical Society; served during the World War; aged 50; died, May 29, of injuries received in an automobile accident.

ORA L. PELTON, Elgin, Ill.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1872; Bellevue Hospital Medical College, New York, 1874; fellow of the American College of Surgeons; surgeon, St. Joseph's and Sherman hospitals; aged 89; died, May 26, of uremia and nephritis.

LADDIE WALTER ZEMAN, Hinsdale, Ill.; University of Illinois College of Medicine, Chicago, 1940; first lieutenant in the medical reserve corps of the United States Army; aged 27; was drowned, June 13, in a lagoon at San Juan, Puerto Rico, when the boat he was sailing capsized.

FRANK S. GRAY, Allendale, Ill.; Medical College of Ohio, Cincinnati, 1883; aged 86; died, May 26, of myocarditis and arteriosclerosis.

JOEL C. FREEMON, Argenta, Ill.; Hahnemann Medical College and Hospital, Chicago, 1903; aged 60; died, May 27, of heart disease.

JOHN ANGIER MACGREGOR, West Frankfort, Ill.; Barnes Medical College, St. Louis, 1898; aged 67; died, May 14, in Chicago.

VIRGINIA DINSMORE, Griggsville, Ill.; Woman's Medical College, Chicago, 1889; aged 87; died, May 26, in Pittsfield, of acute dilatation of the heart.

JOSEPH E. WHARTON, Peoria, Ill.; Drake University Medical Department, Des Moines, Iowa, 1898; aged 67; died, May 10, of coronary thrombosis.

EMMA J. WARREN, Chicago; Northwestern University Woman's Medical School, Chicago, 1893; aged 77; died, May 21.

OTITIS MEDIA

1. Those treating acute otitis media should be familiar with the anatomy of the temporal bone and the symptoms and physical signs of otitic infection.

2. The anatomy of the eustachian tube in infants and young children lends itself to the spread of infection from the nasopharynx to the tympanic cavity.

3. With the first symptom of otitis media the patient should be put at rest and proper treatment instituted.

4. Myringotomy should be performed when the inflammation in the tympanic cavity shows no tendency to undergo resolution.

5. Repeated incisions of the tympanic cavity are rarely indicated provided the first incision is adequate.

6. When sulfanlamide is used, the patient should be under close observation.

7. A mastoidectomy is indicated when the discharge has continued into the second or third week with clinical or roentgen-ray evidence of bone destruction of the mastoid.—*Penn. Med. Jo.*

Since the January-February issue, The Journal of Infectious Diseases has been published by the University of Chicago Press under the editorship of a newly appointed Board of Editors, with William H. Taliaferro, Chairman of the Department of Bacteriology and Parasitology, the University of Chicago, Editor-in-Chief. The Journal is published bi-monthly. It was established in 1904 by the John Rockefeller McCormick Memorial Institute for Infectious Diseases.

Dr. Ludvig Hektoen, editor of the Journal since its founding in 1904, has retired from active participation. Under Dr. Hektoen's editorship, the Journal attained world-wide distinction with subscribers in 49 foreign countries.

Dr. Francis B. Gordon, Assistant Professor of Bacteriology, University of Chicago, who has been on the editorial board for some time, now becomes Managing Editor.

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